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JOURNAL

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

OF

NEW YORK.

MDCCCXCI

VOL. XXIII.

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AMERICAN GEOGRAPHICAL SOCIETY.

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1891.

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Term expires 1892.

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CHARTER OF INCORPORATION.

GRANTED APRIL 13, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of "The American Geographical and Statistical Society," for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and a treasurer and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States, which code, when formed and adopted at a regular meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

5. The Legislature may, at any time, alter or repeal this act.

6. This act to take effect immediately.

STATE OF NEW YORK, } *ss.:*
Secretary's Office,

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

[L. S.] Given under my hand and seal of office, at the city of Albany, this thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON,
Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8, 1871.

STATE OF NEW YORK, NO. 237, IN SENATE. *March 7*, 1871.—Introduced with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8, 1871.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement of geographical science; the collection, classification and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical and scientific knowledge, by lectures, printed publications, or other means; the keeping up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents, and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages, and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce; having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, } ss.:
Office of Secretary of State, }

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

Given under my hand and seal of office, at the city of Albany, this twenty-
[L. S.] second day of May, in the year one thousand eight hundred and
seventy-one.

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

BY-LAWS.

CHAPTER I.

TITLE.

The title of the Society is, "The American Geographical Society."

CHAPTER II.

OBJECTS.

The objects of the Society are, "The collecting and diffusing of geographical and statistical information."

CHAPTER III.

MEMBERS.

1. The Society shall consist of Fellows, Honorary, Corresponding, and *ex-officio* members.

2. Honorary members shall be chosen on account of their distinction in the science of geography or statistics, and not more than twelve of them shall hereafter be elected in any one year.

3. Corresponding members shall be chosen from those who have aided the advancement of geography or statistics.

4. *Ex-officio* members shall be foreign diplomatic representatives and consuls resident in the United States; and United States diplomatic representatives and consuls in foreign countries.

5. Fellows and Corresponding and Honorary members shall be elected as follows: All nominations of candidates shall be openly made in writing at a meeting of the Society, or the Council, by a member thereof, and, together with the name of the member making them, entered on the minutes. The persons thus nominated, when

approved by the Council and elected by the Society, shall, on payment of the initiation fee, if nominated as Fellows, and without such payment if nominated as Corresponding or Honorary members, become members of the Society accordingly.

6. Persons entitled to become *ex-officio* members of the Society shall, on the recommendation of the Council, be, by the Society, constituted and declared to be such members.

7. The name of any member of the Society may, on the recommendation of the Council, and by a vote of two thirds of the members present at a stated meeting of the Society, be dropped from the roll of its members.

CHAPTER IV.

INITIATION FEE AND ANNUAL DUES.

1. The initiation fee, including the dues for the current year, shall be, for a Fellow, ten dollars, to be paid immediately on election.

2. The annual dues thereafter shall be, for a Fellow, ten dollars, to be paid in advance.

3. Any Fellow of the Society, not in arrears, may commute for life all dues for fellowship by the payment at one time, if a Fellow, of one hundred dollars.

4. The name of any Fellow of the Society neglecting for two successive years to pay his annual dues, or at any time wholly refusing to pay them, may by the Council be erased from the list of Fellows of the Society.

5. The fiscal year of the Society shall, for all purposes, be the calendar year—that is, commence on the first day of January, and end with the 31st day of December in each year.

CHAPTER V.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer, and fifteen councillors ; and these, together, shall form the Council of the Society.

2. The officers and members of Council elected at the next

annual election (except the president and treasurer) shall, at their first meeting, divide themselves into three classes, each to embrace one vice-president, one secretary, and five members of the Council ; one of which classes shall hold office one year, one for two years, and another for three years, to be determined at said meeting by lot or otherwise. The president and treasurer shall always be elected annually ; and at each annual election thereafter there shall be elected a vice-president, a secretary, and five members of Council, each for the term of three years.

3. All officers of the Society to be chosen at any election may be voted for on one ballot.

CHAPTER VI.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Tuesday after the first day of January in each and every year hereafter, when the annual election of the officers of the Society shall take place ; and if, from any cause, there shall be a failure of the annual election at the time above designated for that purpose, the same may be held on the Tuesday next following—that is, on the third Tuesday after the first day of January in each year—and of which due notice shall be given.

2. Every member of the Society, who has been such for twenty days or more, and who is not in arrears for his dues for the past year, shall be entitled to vote at the said election.

3. At the annual meeting of the Society the Council shall present a general report of its proceedings and of those of the Society during the past year, and the secretaries and the treasurer shall also present their annual reports.

CHAPTER VII.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless otherwise specially ordered by the Society or the Council, shall hold its stated meetings for the transaction of business on the second Tuesday of each month of the year, except July, August, and September.

2. The president, or, in his absence, one of the vice-presidents, may, and upon the written request of five members, shall, call a

special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the city of New York.

CHAPTER VIII.

ORDER OF BUSINESS.

1. At all stated meetings of the Society for the transaction of ordinary business the order of proceedings shall be as follows:

1. Reading of the Minutes.
2. Reports and Communications from Officers of the Society.
3. Reports from the Council.
4. Reports from Committees.
5. Nominations of Members.
6. Special Orders.
7. Unfinished Business.
8. Miscellaneous Business.
9. Papers Read and Addresses Delivered before the Society.

2. All propositions presented for the action of the Society at any of its meetings shall be in writing, when requested by the presiding officer or any member. A proposition thus presented, when seconded and the question thereon stated from the chair, shall be deemed to be in the possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than once upon the same question until all the other members present desiring to speak shall have spoken, nor more than twice on any question without leave of the Society.

CHAPTER IX.

QUORUM.

At all meetings of the Society nine members present shall constitute a quorum for the transaction of business.

CHAPTER X.

COMMITTEES.

All committees authorized by the Society shall, unless otherwise specially ordered, consist of three members each, and be appointed by the presiding officer.

CHAPTER XI.

PRESIDING OFFICER.

At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or in his absence one of the vice-presidents, or in the absence of both a chairman *pro tem.*, shall immediately take the chair, call the meeting to order, and preside. He shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. He shall also, unless otherwise specially ordered, appoint all committees authorized by the Society ; and at every annual election, before the opening of the polls, he shall appoint two tellers of the election.

CHAPTER XII.

SECRETARIES.

1. Foreign Corresponding Secretary.—It shall be the duty of the foreign corresponding secretary to conduct the general correspondence of the Society with individuals and associate bodies in foreign countries.

2. Domestic Corresponding Secretary.—It shall be the duty of the domestic corresponding secretary to conduct the Society's general correspondence with individuals and associate bodies in the United States.

3. Both the foreign and domestic secretaries shall keep in suitable books to be provided for that purpose, at the Society's rooms, true copies of all letters written by them respectively on behalf of the Society ; and shall preserve, on proper files, at the said rooms, all letters received by them on the same account ; and at each stated meeting of the Society or the Council, they shall respectively report their correspondence, and read the same, or such parts thereof as may be required.

4. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of both may be performed by the other corresponding secretary.

5. The Society may designate a particular officer, or appoint a committee to prepare a letter or letters on any special occasion.

6. Recording Secretary.—It shall be the duty of the recording

secretary to give due notice of the time and place of all meetings of the Society, and to attend the same. He shall keep fair and accurate minutes of the proceedings of the Society, and record the same, when approved, in the Society's Journal. He shall give immediate notice to the several officers and committees of the Society, of all votes, orders, resolves, and proceedings of the Society affecting them or appertaining to their respective duties. He shall prepare a list of the members of the Society entitled to vote, to be handed to the tellers before the opening of the polls at each annual election. He shall officially sign and affix the corporate seal of the Society to all diplomas and other instruments or documents authorized by the Society or Council. He shall have charge of the corporate seal, charter, by-laws, records, and general archives of the Society, except so far as they may be expressly placed under the charge of others. He shall certify all acts and proceedings of the Society, and shall notify the Council of the death, resignation, or removal of any officer or member of the Society. He shall have charge of the rooms of the Society, and shall perform all such other and further duties as may from time to time be devolved upon him by the Society or the Council. He, together with the Council, shall have the charge and arrangement of the books, maps, and collections belonging to the Society. He shall cause to be kept in the rooms of the Society a registry of all donations to the library or collections of the Society, acknowledge their receipt by letter to the donors, and report the same in writing to the Society at its next stated meeting.

7. All documents relating to the Society and under the charge of the secretaries respectively, shall be placed in such depositories in the rooms of the Society as the Council may provide and designate for that purpose.

CHAPTER XIII.

TREASURER.

The Treasurer shall have charge of and safely keep all contracts, certificates of stock, securities, and muniments of title belonging to the Society. He shall collect the dues and keep the funds of the Society, and disburse the same under the direction of the Council; and so often as the said funds in the hands of the treasurer shall amount to one hundred dollars, he shall deposit the same, in the name of the Society, in some incorporated bank in the city of New York, to be designated for that purpose by the Council; and the said funds, thus deposited, shall be drawn out of the said bank on the check of the treasurer, countersigned by the chairman of the Council, and only for the legitimate and authorized purposes of the Society. The treasurer shall, previous to the annual meeting of the Society, prepare and submit to the Council for audit, a detailed account of his receipts and disbursements for account of the Society during the past year; and which annual account, duly audited, he shall present, with his general report, to the Society at its annual meeting.

CHAPTER XIV.

COUNCIL.

1. The Council shall have the management and control of the affairs, property, and funds of the Society, and shall designate an incorporated bank in the city of New York, where the said funds shall, from time to time as they accrue, be deposited by the treasurer.

2. It may frame its own by-laws, not inconsistent with the charter or by-laws of the Society.

3. It shall appoint the necessary agents, clerks, and servants of the Society, with such powers and duties, privileges and compensation as it may from time to time determine; and may at pleasure revoke such appointments, and make others in their stead.

4. It shall have power to fill, for the unexpired term, any vacancy that may occur in any of the offices of the Society.

5. It shall have power, at its discretion, to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months; and also by a vote of a majority of the whole Council to remove from its own body any member thereof for cause; but in such case it shall be the duty of the Council to report every such vacancy or removal to the Society, at its next stated meeting thereafter, when such cases shall be subject to review by the Society.

6. It shall not, without an approving vote of the Society at a stated meeting thereof, make any contract whereby a liability in amount above one thousand dollars may be incurred by the Society; nor

without such vote make any sale or disposition of the property of the Society exceeding that sum in value.

7. The Council may, in its discretion, remit the initiation fee or annual dues of any member of the Society.

8. No member of the Council shall receive any salary or pecuniary compensation for his services.

9. The Council shall hold stated meetings for the transaction of business at least once in every month, except the months of July, August, and September.

10. At all meetings of the Council, five members present shall constitute a quorum for the transaction of business.

CHAPTER XV.

GENERAL PROVISION AS TO DEBT.

No debt on account of the Society, beyond the funds in the treasury for its payment, shall for any purpose, at any time, be incurred; and if at any time it shall appear that there are resting upon the Society pecuniary obligations beyond the funds in the treasury for their liquidation, no appropriation of funds from the treasury whatever, except for the necessary current expenses of the Society, shall be made, until the said pecuniary obligation shall be fully discharged, or the funds necessary for their extinction shall have been set apart for that purpose.

CHAPTER XVI.

ALTERATION OF THE BY-LAWS.

No alteration in the by-laws of the Society shall be made unless openly proposed at a stated meeting of the Society, entered on the minutes, with the name of the member proposing the same, and adopted by the Society at a subsequent meeting, by a vote of two thirds of the members present.

CHAPTER XVII.

ADOPTION OF THE BY-LAWS.

The foregoing are hereby adopted and declared to be the by-laws of the Society; and all by-laws of the Society heretofore adopted are hereby rescinded and declared to be null and void.

HONORARY AND CORRESPONDING MEMBERS AND FELLOWS.

HONORARY MEMBERS.

Baker, Sir Samuel W., F.R.S., F.R.G.S.

Constantine Nicolaïevitch, the Grand Duke, President of the Imperial Russian Geographical Society, St. Petersburg.

Dufferin and Ava, the Marquis of.

Elder, Sir Thomas, Adelaide, South Australia.

Ismaïl, ex-Khedive of Egypt

Layard, Sir Austen Henry, D.C.L.

Markham, Clements R., C.B., Secretary of the Royal Geographical Society.

McClintock, Admiral Sir F. L., R.N.

Nares, Rear-Admiral Sir George S., R.N., K.C.B.

Nordenskiöld, Baron A. E., Stockholm.

Pedro II., ex-Emperor of Brazil.

Rawlinson, Major-General Sir Henry C., K.C.B., Vice-President of the Royal Geographical Society.

CORRESPONDING MEMBERS.

Abbe, Prof. Cleveland, Washington.

Ammen, Rear-Admiral Daniel, U.S.N., Washington.

Bartholomew, John, Edinburgh.

Brewer, Prof. Wm. H., New Haven.

Brownlee, Harrison J., C.E., Manitoba.

Bonaparte, Prince Roland, Paris.

Chaix, Prof. Paul, Geneva, Switzerland.

Chaix, Prof. Emile. Geneva, Switzerland.

Davidson, Prof. Geo., U. S. Coast and Geodetic Survey, San Francisco.

Gardner, Prof. James T., Albany.

Gilliodts van Severen, L., LL.D., Bruges.

Gilman, Daniel C., LL.D., President Johns Hopkins University, Baltimore.

Leclercq, Jules, Brussels.

Lesseps, Ferdinand de, Paris.

Long, Col. C. Chaillé.

Luce, Admiral S. B., U.S.N.

Lumholtz, Carl, M. A., Christiania, Norway.

Maunoir, Charles, Paris.

Maury, Louis Ferdinand Alfred, Paris.

McCartee, D. Bethune, M.D., New York.

Negri, Cristoforo, Turin.

Ney, Count Napoléon, Paris.

Packard, Prof. A. S., Providence, R. I.

Peralta, Manuel M. de, Liege.

Pumpelly, Prof. Raphael.

Rae, John, M.D., F.R.S., London.

Romero, Matias, Envoy of Mexico at Washington.

Stanley, Henry M.

Taché, E. E., Asst. Commissioner of Crown Lands, Quebec.

Vincent, Frank, New York.

Vivien de Saint-Martin, Versailles.

Walker, Gen. Francis A., LL.D., Boston.

Wright, Gen. Horatio G., U.S.A., Washington.

Wyse, Lt.-Com. Lucien N. B., Paris.

Whitehouse, F. Cope.

FELLOWS.

CORRECTED TO DECEMBER 31, 1891.

Date of Election.
1859 Arnoux, Hon. William H.
1869 Auchmuty, Richard Tylden.
1871 Atterbury, Rev. Wm. W., D.D.
1872 Allen, Horatio M., S. Orange, N. J.
1873 Albert, Halpern.
1874 Alexander, Junius B.
1874 Avery, Samuel P. (L. F.)
1874 Agnew, John T. (L. F.)
1874 Allen, Hon. Henry Wilder.
1874 Amy, Henry. (L. F.)
1874 Agnew, Alexander McL.
1874 Astor, Hon. W. W. (L. F.)
1875 Amsinck, Gustav.
1876 Appleton, Nathan, Boston.
1879 Austin, William.
1879 Agostini, Joseph.
1881 Armour, Herman O. (L. F.)
1883 Ames, Adelbert, Highlands, N. J.
1883 Aub, Albert.
1883 Atterbury, J. T. (L. F.)
1883 Aikman, Walter M.
1883 Adams, William.
1884 Abbott, Frank, M.D.
1885 Agnew, Andrew G.
1885 Adams, C. H.
1885 Auchincloss, E. S.
1886 Appleton, Wm. H.
1886 Agassiz, Prof. Alex., Cambridge, Mass.
1886 Allen, Chas. Slover, M.D.
1886 Alden, R. Percy.
1887 Andrews, Wm. L.
1887 Alexander, Robert C.
1887 Archbold, John D. (L. F.)
1887 Allen, Timothy Field.
1888 Alexander, J. F.
1889 Atkinson, C. F., Boston.
1889 Alexander, E. P., Savannah, Ga.

Date of Election.
1889 Adams, Hon. Geo. E., Chicago.
1889 Amory, Wm. N.
1889 Atkinson, Hoffman, Anniston, Ala.
1889 Armstrong, David W.
1889 Abbot, Edwin H. (L. F.) Boston.
1890 Andreini, J. M.
1890 Astor, John J.
1890 Anderson, Arthur A. (L. F.)
1890 Alger, Horatio, Jr.
1890 Ackermann, B. L., Inwood-on-the-Hudson, N. Y.
1891 Aufhauser, Samuel.
1891 Arms, Geo.
1891 Agar, Jno. G.
1891 Adams, W. H.
1891 Atkinson, John B., Earlington, Ky.
1891 Armstrong, Colin.
1891 Apgar, Maj. D. J., U. S. A.

1852 Bancroft, Hon. George. (L. F.) Washington, D. C.
1852 Barney, Hiram. (L. F.)
1856 Baker, Francis. (L. F.)
1859 Boorman, J. Marcus (L. F.) Brooklyn, N. Y.
1859 Bernheimer, Isaac.
1865 Banvard, John. (L. F.)
1868 Banks, David. (L. F.)
1868 Bennett, James Gordon.
1868 Bernheimer, Adolph.
1868 Bernheimer, Simon.
1869 Bailey, Jas. Mühlenberg. (L. F.)
1869 Banyer, Goldsboro.
1869 Bickmore, Prof. A. S.
1869 Bierstadt, Albert. (L. F.)
1872 Brown, Walston H.
1873 Bailey, N. P.

1874 Bishop, D. W. (L. F.)
1874 Bien, Julius.
1874 Bissinger, Philip.
1874 Backus, Henry C. (L. F.)
1874 Baldwin, Townsend B., (L. F.)
Tuxedo Park, N. Y.
1874 Barnes, John S.
1874 Bonner, Robert
1874 Benjamin, John.
1874 Butler, William Allen.
1874 Barr, William.
1874 Belding, Milo M.
1874 Bookstaver, Hon. Henry W.
1874 Brownson, Commander W. H., U. S. N. (L. F.)
1875 Barney, Charles T.
1875 Beaman, Charles C.
1875 Bernheimer, J. A.
1875 Beckwith, Leonard F.
1875 Bedle, Hon. Jos. D.
Jersey City, N. J.
1875 Beekman, Gerard.
1875 Brownell, Silas B.
1875 Barnes, William.
1875 Beste, Henry.
1875 Belknap, Rear Adm. Geo. E., U. S. N.
1876 Brower, John.
1877 Bixby, Robert F. (L. F.)
1877 Blanchard, George R.
1877 Blatchford, Eliphalet W.,
Chicago, Ill.
1878 Bliss, Cornelius N. (L. F.)
1878 Barton, Oliver Grant. (L. F.)
1878 Brown, Rev. Philip A. H.
1878 Brand, James.
1878 Brown, J. Romaine.
1879 Barattoni, C. A.
1880 Banks, D. S. (L. F.)
1881 Baldwin, Edwin. (L. F.)
1881 Baldwin, Christopher C.
1881 Babcock, Samuel D.
1881 Backus, Henry Landon.
1882 Bamberger, Jacob F.
1882 Baldwin, Octavius D.
1882 Ballin, Gustav N.
1882 Bacon, Francis McNeil.
1882 Babcock, George H.
1882 Barger, Samuel F. (L. F.)
1882 Barney, Newcomb C.
1883 Barclay, J. Searle.
1883 Brewster, Benj. (L. F.)
1883 Baker, Cyrus O.
1883 Beekman, Wm. B.
1883 Berry, Oliver F.
1883 Bowne, Walter. (L. F.)
1883 Banta, Theodore M.
1883 Barr, Edward.
1883 Bergen, Tunis G.
1883 Battell, Robbins.
1883 Bennet, Ludovic.
1883 Blake, Frederick D.
1883 Bell, Capt. W. R.
1883 Benson, Frank Sherman.
1884 Bentley, Henry. (L. F.)
Philadelphia, Pa.
1884 Burrall, F. A., M. D.
1884 Bangs, Fletcher H.
1884 Bonner, G. T. (L. F.)
1884 Brookfield, William.
1884 Bassett, E. D.
1885 Bliss, George T.
1885 Burnet, Robt. W., Cincinnati, O.
1886 Barker, P. C., M. D. (L. F.)
Morristown, N. J.
1886 Benjamin, Hon. S. G. W.
1886 Brown, Hon. Addison. (L. F.)
1886 Bridgman, E. C.
1886 Buckley, Rev. J. M., D. D.
1886 Bostwick, J. A. (L. F.)
1886 Blakeman, Birdseye.
1886 Bowers, John M.
1886 Bruno, Richard M.
1886 Backus, J. Bayard.
1886 Bouvier, M. C.
1886 Beddall, Edward F.
1886 Berwind, Edward J.
1886 Bliss, Alex., Washington, D. C.
1886 Bond, Frank S.
1887 Brown, Robt. I. (L. F.)

1887 Blagden, George.
1887 Biglow, Lucius H. (L. F.)
1887 Brown, Wm. C.
1887 Berrian, Charles M.
1887 Bradley, Leonard A. (L. F.)
New Haven, Conn.
1887 Booth, Fredk. A.
1887 Bentley, John
1887 Bend, George H.
1887 Belden, Josiah.
1887 Barbey, Henry I. (L. F.)
1887 Barron, John C., M. D. (L. F.)
Tarrytown.
1888 Bristow, Hon. Benj. H.
1888 Booker, Wm. Lane.
1888 Bogert, S. G.
1888 Berghaus, Dr. Alex.
1888 Buckham, George.
1888 Bruce, Sanders D.
1888 Bancroft, H. H. (L. F.)
San Francisco, Cal.
1888 Burgess, John W.
1888 Brown, Wm. Smith.
1888 Ballou, Maturin.
1888 Breckinridge, Hon. Wm. C. P.,
Lexington, Ky.
1888 Baird, John.
1888 Bacon, Lathrop R.
1888 Bogert, Henry L.
1888 Beers, M. H.
1888 Barstow, J. Whitney, M. D.,
Flushing, N. Y.
1889 Blake, Francis, Weston, Mass.
1889 Benson, James H.
1889 Beyer, John A.
1889 Barnes, Thurlow Weed, Boston.
1889 Bromberg, Fredk. G.,
Mobile, Ala.
1889 Bentley, Norman S.
1889 Brimmer, Martin, Boston.
1889 Biddle, Edward R.
1889 Bigelow, Poultney. (L. F.)
1889 Baring, Thos.
1889 Bissell, Arthur F.
1889 Brown, Wm. Reynolds.
1889 Baldwin, W. D.
1889 Bleything, Geo. Dacre, M. D.
1889 Bidwell, Chas. E.
1889 Bidwell, D. H.
1889 Browning, J. H. Brower, M. D.
1889 Birdsall, W. R., M. D.
1889 Barnes, W. H., Philadelphia.
1890 Bliss, D. L. (L. F.)
Carson City, Nev.
1890 Benedict, Jas. H.
1890 Barnard, Jno. F., Cincinnati, O.
1890 Brooker, Chas. F.,
Torrington, Conn.
1890 Bertschmann, J., Swiss Consul.
1890 Bushnell, Jos.
1890 Bergen, Jas. C.
1890 Boyd, Jno. Scott. (L F.)
1890 Brackenridge, G. W. (L. F.)
San Antonio, Tex.
1890 Brewster, C. O.
1891 Booth, Edwin. (L. F.)
1891 Briggs, W. S., Keene, N. H.
1891 Bernheim, Gustav.
1891 Babcock, Stephen E.,
Little Falls, N. Y.
1891 Belin, Henry, Jr., Scranton, Pa.
1891 Boies, H. M., Scranton, Pa.
1891 Barrett, Lawrence.
1891 Barber, Amzi L.
1891 Besly, Chas. Howard, Chicago.
1891 Brice, Hon. Calvin S.
1891 Bogue, Virgil G., Omaha.
1891 Bendit, Louis A.
1891 Bell, Ed. W.
1891 Burtis, Ed. H.
1891 Blanchard, Jas. A.

1852 Colton, Joseph H. (L. F.)
1855 Conkling, Col. Fredk. A. (L. F.)
1856 Cooper, Hon. Edward.
1868 Catlin, N. W. Stuyvesant. (L. F.)
1868 Chapman, Joseph H.
1869 Cullum, Gen. George W.,
U. S. Army. (L. F.)
1870 Conklin, William A.

1872 Conklin, Edward E. (L. F.)
1872 Crawford, Gen. S. W., U. S. A.
1872 Clark, E. V.
1874 Campbell, Allan.
1874 Church, Col. George E. (L. F.)
London, Eng.
1874 Chickering, Charles F.
1874 Comstock, Cornelius.
1874 Constable, James M.
1874 Crocker, David.
1874 Crosby, Hon. J. Schuyler.
1874 Colgate, James B.
1874 Constantine, Andrew J.
1874 Conyngham, Wm. L. (L. F.)
1874 Crocker, Geo. A.
1874 Chickering, George H.,
Boston, Mass.
1874 Carter, Oliver S., Orange, N. J.
1875 Clendenin, J. W.
1875 Cameron, Sir Roderick W. (L. F.)
1875 Cooper, George C. (L. F.)
1875 Chittenden, S. B.
1876 Curtis, Benj. L.
1879 Coddington, Gilbert S. (L. F.)
1879 Childs, George W.,
Philadelphia, Pa.
1880 Calvin, Delano C.
1880 Cohen, Maurice S.
1881 Clinton, Henry L. (L. F.)
1882 Clarkson, Banyer.
1882 Coudert, F. R., LL.D.
1882 Conklin, Rev. N. W., D.D.
1883 Clarke, Thos. C.
1883 Chapman, Henry E. (L. F.)
1883 Clyde, W. P.
1883 Clews, Henry.
1883 Coit, George M.
1884 Claflin, John. (L. F.)
1884 Cook, John C.
1884 Carey, Henry T.
1884 Connor, W. E. (L. F.)
1886 Cary, Alanson.
1886 Conger, Clarence R.
1886 Crosby, Rev. Howard, D.D.
1886 Cooke, Henry C.
1886 Coffin, Edmund, Jr.
1886 Church, Benjamin S.
1886 Corthell, E. L., Chicago.
1886 Clarke, Stephen G.
1886 Carter, Henry C.
1886 Colvin, Verplanck, Albany, N. Y.
1886 Clarke, C. C.
1886 Calder, George.
1886 Camp, Hugh N.
1886 Chauncey, Elihu. (L. F.)
1887 Clark, Jefferson.
1887 Cheney, Alfred C.
1887 Comstock, Anthony.
1887 Cannon, H. W.
1887 Conover, A. E.
1887 Cranitch, Wm. I. A.
1887 Curtis, Geo. Wm.
1887 Compton, A. T.
1887 Cleveland, Clement, M. D.
1888 Colgate, Abner W.
1888 Crimmins, John D.
1888 Cotheal, Alex. I. (L. F.)
1888 Chase, George.
1888 Coutan, Adolphe R. (L. F.)
1888 Coutan, Chas. Albert. (L. F.)
1888 Clark, Alfred Corning. (L. F.)
1888 Cook, Henry H.
1888 Canda, Chas. J.
1888 Coleman, James S.
1888 Cross, Richard J.
1888 Coston, Wm. F.
1888 Chapin, Fred'k H.,
Hartford, Conn.
1888 Chrystie, Wm. F.
1888 Chisholm, George E.
1888 Cochran, Wm. F. (L. F.)
1888 Clement, Percival W.
1889 Coxe, Henry B. (L. F.)
1889 Conger, A. L., Akron, O.
1889 Clark, Chas. F.
1889 Cheever, John D.
1889 Crane, Chas. R., Chicago.
1889 Clausen, George C.
1889 Comstock, Geo. Carlton.
1889 Clark, Wm. Hancock.

1889 Cole, Eugene M.
1889 Carter, John J. (L. F.)
Titusville, Pa.
1890 Chanler, Wm. Astor.
1890 Collett, Jos., Terre Haute, Ind.
1890 Carter, A., Jr.
1890 Coles, Edwin S.
1890 Cockcroft, Miss Mary T.
1890 Carnrick, Jno.
1890 Clemens, Harold.
1890 Cleveland, Hon. Orestes,
Jersey City, N. J.
1890 Chambers, Hilary R.
1890 Crane, Wm. H.
1891 Cohen, Sam'l M.
1891 Castle, Fred'k. A., M.D.
1891 Coates, Geo. M., Philadelphia.
1891 Cogswell, W. B., Syracuse.
1891 Clapp, Geo. H., Pittsburg.
1891 Cook, J. Hervey,
Fishkill-on-Hudson.
1891 Cooper, John.
1891 Calhoun, W. H., Jr.,
Butte City, Mont.

1855 Daly, Charles P., LL.D. (L. F.)
1856 Douglas, Andrew E.
1856 Dodge, Wm. E.
1856 Detmold, Wm., M.D.
1866 Darling, Hon. Wm. A.
1868* Dwight, Theo. W., LL.D.
1868 Du Chaillu, Paul B.
1870 Davis, Alexander J. (L. F.)
Orange, N. J.
1871 Daly, Hon. Joseph F.
1873 Delano, Franklin H. (L. F.)
1874 dePeyster, Gen. J. Watts. (L. F.)
1874 Dutilh, Eugene.
1874 Delafield, M. L.
1874 Dana, Charles A.
1874 del Monte, Leonardo,
Washington, D. C.
1874 Du Bois, Wm. A.
1874 Dunscombe, Richard T. (L. F.)
1874 Dun, R. G.
1875 Davies, Julien T.
1875 Du Bois, Eugene.
1875 Davison, Charles A.
1875 de Peyster, Frederic J. (L. F.)
1875 Dommerich, L. F.
1877 Day, Henry M.
1877 Davis, Joseph Beale. (L. F.)
Orange, N. J.
1878 di Cesnola, Gen. L. P.
1879 Dahlgrén, Charles B.,
Trenton, N. J.
1880 Deane, John H. (L. F.)
1880 Dyckman, Isaac M.
1880 Du Bois, James G.
1880 Du Bois, Frederick N.
1880 Dexter, Henry. (L. F.)
1880 Deen, Wm. M. (L. F.)
1881 Davies, H. B.
1881 Docharty, Augustus T. (L. F.)
1882 Dunham, George H.
1882 Dunlap, Robert. (L. F.)
1883 Donnell, E. J. (L. F.)
1883 Decker, Jos. S.
1884 Davis, Howland.
1884 Day, Henry.
1884 Donnelly, Thomas F.
1884 Dodge, Richard J.
1884 Dalley, Henry, Jr.
1884 Douglas, Jas., Jr.
1885 Dupré, Ovide. (L. F.)
1885 De Witt, George G.
1886 Dix, Rev. Morgan, D.D.
1886 de Lancey, Edward F.
1886 Dayton, Chas. W.
1887 Dickson, John.
1887 Day, Prof. Edward H.
1887 de Forest, George B.
1887 Davenport, W. F., M.D.
1887 Dodman, Alfred C.
1887 de Castro, Hector.
1887 Donald, James M.
1887 Doudge, James R. (L. F.)
1888 Davidson, Prof. Thos.
1888 Donnelly, Edward C.
1888 Dunham, James H.

1888 Drexel, A. J., Philadelphia, Pa.
1888 Drexel, Mrs. Joseph W.
1888 Davenport, Hon. Ira. (L. F.) Bath, N. Y.
1888 Dyer, E. Tiffany.
1889 Day, Thomas.
1889 De Zeller, John R.
1889 Denning, Edwin J.
1889 Dodd, S. C. T.
1889 Durkee, Eugene W.
1889 Dwight, Jonathan, Jr.
1889 DuPont, H. A., Wilmington, Del.
1889 Daley, Geo. H.
1889 Deal, W. E. F., Virginia City, Nev.
1889 Donald, Peter. (L. F.)
1889 de Goicouria, A. V.
1889 Dexter, Julius, Cincinnati.
1889 Dix, J. Augustus, Elizabeth, N.J.
1890 Douglas, O. B., M. D.
1890 Davis, Hon. John, Washington, D. C.
1890 Dellinger, Chas. F.
1890 Dulles, Wm., Jr.
1890 Davis, Robt. T., M. D., Fall River, Mass.
1890 Dinsmore, C. Gray. (L. F.)
1890 DuVivier, C. A.
1891 Drey, Max.
1891 Doane, W. H., Cincinnati.
1891 Davids, Chas. H.
1891 Dillingham, Thos. M., M. D.
1891 D'Orville, Adolphe.

1859 Evarts, Hon. William M.
1868 Emmet, Thomas Addis, M. D.
1874 Eaton, Prof. D. Cady, New Haven, Conn.
1875 Ellis, John W.
1875 Eimer, Charles.
1875 Ely, Richard S.
1877 Elderkin, John.
1878 Ellis, John, M. D.
1879 Earle, Ferdinand P.
1879 Elliott, Samuel. (L. F.)
1880 Eckert, Gen. Thomas T.
1882 Easton, Nelson S.
1882 Ellis, Wilbur Dixon.
1882 Eddy, Ulysses D.
1882 Edwards, Hon. J. Pierrepont.
1882 Emerson, J. W. (L. F.)
1882 Emmons, John.
1882 Earle, Joseph P. (L. F.)
1883 Eno, Amos F.
1883 Eyre, Maynard C.
1883 Earl, Wm. M.
1885 Elmore, Hon. J. Federico, Washington, D. C.
1886 Easton, Robt. T. B. (L. F.)
1886 Ellis, Geo. W.
1886 Edwards, Walter.
1887 Ely, James R.
1887 Eckert, Wm. H.
1887 Elkins, Hon. S. B.
1887 Eastman, Timothy C.
1887 Egleston, Melville.
1888 Edgecomb, Daniel W.
1888 Edmunds, Hon. George F., Burlington, Vt.
1889 Eldridge, Edward, Whatcom, Wash.
1889 Emmet, Wm. T., Pelham, N. Y.
1889 Elliot, Mrs. M. Schuyler, Brooklyn.
1889 Ewing, Jay.
1890 Enos, Alanson T.
1891 Eustis, W. E. C., Boston.
1891 Edgerton, E. D., Helena, Mont.
1891 Eyerman, John, Easton, Pa.

1854 Field, Cyrus W. (L. F.)
1856 Field, Hon. David Dudley.
1856 Field, B. H. (L. F.)
1857 Fish, Hon. Hamilton.
1860 Field, Rev. H. M.
1864 Faile, Thomas H.
1871 Fliess, Wm. M.
1873 Freedman, Hon. John J.
1874 Farragut, Loyall.
1874 Fellows, John P.

1874 Fleet, Oliver S.
1874 Fox, Austin G. (L. F.)
1875 Fargo, James C.
1875 Fuller, Charles D.
1875 Ford, James B.
1875 Folsom, George W.
1879 Fellows, John R.
1880 French, Hon. Stephen B.
1881 Fearing, William H.
1882 Fairbanks, Leland.
1882 Fellows, Charles H.
1883 Fisher, Eustace W., M. D. (L. F.)
1884 Fraser, Alfred.
1885 Frank, Elias L. (L. F.)
1885 Fitch, Chas. E., Rochester, N.Y.
1886 Flagler, H. M. (L. F.)
1886 Fettretch, Joseph.
1887 Friedrichs, E. H.
1887 Fitzgerald, Louis.
1887 Fairfax, Hamilton R.
1887 Floyd, John Gelston.
1887 Fellows, Gordon.
1888 Fish, Nicholas.
1888 Ferguson, Walton. (L. F.)
Stamford, Conn.
1888 Ford, Hon. Melbourne H.,
Grand Rapids, Mich.
1889 Felton, Thos. Cary, Boston.
1889 Frazar, Everett.
1889 Fenton, David W. (L. F.)
1889 *Freeland, Theodore H.
1889 Flint, Chas. R.
1889 Felton, S. M., Jr.
1889 Freeman, Wm. C., Cornwall, Pa.
1889 Fisher, Robt. C.
1889 Fitzpatrick, Chas. J.
1889 Forman, Prof. Geo., Newark, N. J.
1890 Fairbanks, Franklin,
St. Johnsbury, Vt.
1890 Fellowes, F. Wayland,
New Haven, Conn.
1890 Ferrero, Gen. Leopoldo.
1890 Fairchild, Hon. Chas. S.
1890 Farnam, Henry W.,
New Haven, Conn.
1890 Fearing, Daniel B. (L. F.)
Newport, R. I.
1891 Fleming, Harry S.,
Memphis, Tenn.
1891 Ferguson, Robt. W.
1891 Fitz, Eustace C.
1891 Ferguson, J. W.

1856 Greenwood, Isaac J.
1857 Greene, John W., M. D. (L. F.)
1868 Gebhard, Wm. H. (L. F.)
1868 Gerry, Elbridge T. (L. F.)
1868 Green, Andrew H.
1869 Gilbert, Clinton.
1872 Gerard, James W.
1872 Grinnell, R. M. (L. F.)
Skaneateles, N. Y.
1874 Gunther, F. F.
1874 Gibbs, Theodore K. (L. F.)
1874 Galpen, Horace.
1877 Guleke, H. F., M.D.
1879 Graves, Arthur B. (L. F.)
1879 Gay, Joseph E.
1881 Gallaway, R. M.
1881 Green, George. (L. F.)
1881 Grace, Hon. William R. (L. F.)
1881 Garland, James A.
1882 Gallup, Albert.
1882 Gardiner, J. Grahame.
1883 Greenough, John (L. F.)
1883 Gottschalk, Felix.
1883 Goodridge, John C., Jr. (L. F.)
1885 Glazier, Simon W.
1885 Gibson, George R.
1886 Gallatin, Frederic.
1886 Grummon, J. Ward.
1886 Georger, Louis F.
1886 Gunther, W. H., Jr.
1886 Gunther, Franklin L. (L. F.)
1886 Gunther, Ernest Rudolph.
1886 Godwin, Parke.
1886 Goodwin, James J. (L. F.)
1886 Grant, James.
1886 Godkin, E. L.
1887 Goodridge, Frederic.

1887 Grosvenor, Jas. B. M. (L.F.)
1887 Gould, George J.
1887 Gossler Gustav H.
1887 Griswold, John N. A.
1888 Goodwin, C. Ridgely, Baltimore, Md.
1888 Goodwin, Chas. S.
1888 Greene, Byron W.
1888 Gard, Anson A.
1888 Grafton, Joseph.
1889 Gillis, Chas J.
1889 Grinnell, Geo. Bird.
1889 Gurnee, Augustus C.
1889 Gage, E. B. (L. F.) Tombstone, Arizona.
1889 Gilbert, G. K., Washington, D. C.
1889 Gargiulo, Joseph A.
1889 Gardiner, John L. (L. F.) Boston.
1889 Gest, Erasmus. (L. F.) Cincinnati, Ohio.
1890 Goldthwaite, Wm. M.
1890 Garden, Hugh R.
1890 Godfrey, Chas. H.
1890 Green, Caleb S. (L. F.) Trenton, N. J.
1890 Gardiner, John Lyon.
1890 Goldthwaite, Jas. C.
1891 Galloupe, Chas. W., M.D., Lynn, Mass.
1891 Greene, David M., Troy, N. Y.
1891 Gaines, Rich'd H., Richmond, Va.
1891 Gottlieb, Dr. J. Adelphi.
1891 Gay, Edward, Mt. Vernon, N. Y.

1856 Hewitt, Hon. Abram S.
1856 Hunt, Wilson G.
1859 Havemeyer, John C. (L. F.)
1864 Hammond, Henry B. (L. F.)
1868 Huntington, Daniel. (L. F,)
1868 Hall, Elial F.
1869 Hadden, John A. (L. F.)
1871 Hand, Clifford A.
1872 Holbrook, Levi. (L. F.)
1873 Havemeyer, Hon. Theo. A.
1874 Hurlbert, Henry A. (L. F.)
1874 Haydock George G.
1874 Haines, John P.
1874 Hinton, John H., M.D. (L. F.)
1874 Holbrook, Edmund F.
1874 Hendricks, Edmund.
1874 Hendricks, Joshua.
1874 Hatch, Rufus.
1874 Huntington, C. P. (L. F.)
1874 Hunter, Maj. Edward, U. S. A.
1874 Hoyt, Harlow M.
1875 Houston, Col. D. C., U. S. A.
1875 Hyde, Henry B.
1875 Harper, P. J. A.
1875 Harris, Sigmund.
1875 Hun, Leonard G., Albany, N. Y.
1876 Holt, Henry.
1876 Hoes, Wm. M.
1876 Hatfield, J. B. T.
1878 Hinman, Wm. K.
1878 Hitchcock, Hiram. (L. F.)
1879 Hamilton, Wm. G.
1879 Harris, Col. Robert.
1880 Hickox, Charles R.
1881 Hinman, Russell.
1882 Hascall, Theodore F.
1882 Higginson, James J.
1883 Hotchkiss, Horace L.
1883 Hebert, Henry B. (L. F.)
1883 Howell, George R.
1883 Hyde, E. Francis.
1883 Hurry, Edmund Abdy. (L. F.)
1883 Hoyt, Alfred M. (L. F.)
1883 Hendricks, Arthur T.
1885 Hubbard, Walter, Meriden, Ct.
1885 Homer, Chas. S., Jr.
1885 Henry, Edward L.
1886 Hoe, Robert.
1886 Huidekoper, Arthur C., Meadville, Pa.
1886 Henderson, Harold G.
1886 Hoyt, Colgate.
1886 Hoffman, Rev. Eugene A., D.D.
1886 Hawley, E. Judson.

1886 Hildreth, David M.
1886 Hitchcock, Bradford W.
1886 Hillhouse, Thomas G.
1887 Hinchman, Walter.
1887 Hastings, Prof. Thos. S., D.D.
1887 Huntington, Geo. S., M.D.
1887 Hague, James D.
1887 Hurd, S. H., M.D., Skaneateles, N. Y.
1887 Hunker, Lieut. J. J., U. S. N.
1887 Horsford, Prof. E. N., Cambridge, Mass.
1887 Hopping, A. Howard.
1887 Hayes, Richard Somers.
1887 Howell, Theodore D.
1887 Hodgman, George F.
1887 Hill, James K.
1887 Hoadly, Hon. George.
1887 Holbrook, Edward.
1888 Hard, Anson W.
1888 Hoyt, Henry R. (L. F.)
1888 Hathaway, Horatio, New Bedford, Mass.
1888 Hammond, Charles E.
1888 Hayward, James W.
1888 Higley, Hon. Warren.
1888 Harbeck, Chas. T., Islip, N. Y.
1889 Huntington, Chas. P. (L. F.)
1889 Hinrichs, C. F. A.
1889 Haynes, Prof. Henry W., Boston.
1889 Hastings, W., Wilmington, Del.
1889 Hurtt, Frank D. (L. F.)
1889 Harden, Hon. Wm. D., Savannah, Ga.
1889 Heilprin, Prof. Angelo, Philadelphia.
1889 Hayden, Brace.
1889 Harper, Orlando M.
1889 Hazard, Rowland, Providence, R. I.
1889 Hubbard, Gardiner G., Washington, D. C.
1889 Hamilton, Edmond Horace.
1889 Hendrie, Wm. C.
1889 Hallidie, A. S., San Francisco.
1889 Hitchcock, Welcome G. (L. F.)
1889 Hogg, T. Egenton.
1889 Henderson, Norman.
1889 Holloway, Josephus F.
1889 Hoagland, C. N., M.D. (L. F.) Brooklyn.
1889 Hayward, John H.
1889 Hardee, John L., Savannah, Ga.
1889 Harrower, H. D.
1889 Howells, Henry C.
1889 Hain, Frank K.
1889 Halsted, James M.
1889 Harper, Edward B.
1889 Henley, Wm. I.
1889 Harriott, Samuel C. (L. F.)
1889 Hackstaff, Alexander G.
1890 Hill, James J., St. Paul, Minn.
1890 Harriman, J. Arden.
1890 Husted, Seymour L., Jr.
1891 Henderson, Joseph J., Kingsbridge, N. Y.
1891 Hall, John H., Hartford, Conn.
1891 Haas, Calman.
1891 Hermann, A.
1891 Hazard, Fred'k. R., Syracuse.
1891 Harrison, Alex.
1891 Howe, J. Morgan, M. D.

1859 Ireland, John B.
1874 Iselin, Adrian, Jr.
1881 Ives, Brayton. (L. F.)
1883 Ives, James M.
1886 Irving, John Treat.
1887 Isham, Charles. (L. F.)
1887 Inslee, Samuel.
1887 Ivison, David B. (L. F.)
1888 Irving, Cortlandt.
1889 Ickelheimer, Isaac.
1890 Irving, Walter.

1852 Jay, Hon. John. (L. F.)
1852 Jones, John D. (L. F.)
1871 Jones, Walter R. T.
1874 Judson, Wm. D.
1874 Jesup, M. K. (L. F.)

1874 Jaffray, Edward S.
1874 Jenkins, Wm. L.
1874 James, D. Willis.
1874 Jaffray, Robert.
1879 Jay, William.
1880 Jewett, George L.
1881 Jewett, Hugh J., Glenville, Md.
1881 Johnson, Bradish, Jr.
1882 Jasper, John.
1883 Judson, A. M.
1885 Juilliard, A. D.
1886 Janeway, Henry L., New Brunswick, N. J.
1886 Jacobi, A., M.D.
1886 Jennings, O. B.
1886 Jackson, Rev. Samuel M.
1887 Jenkins, Augustus S.
1888 Jones, Oliver L. (L. F.)
1888 Jackson, Oswald.
1889 Jayne, Frank A.
1889 James, Geo. Abbot, Boston.
1890 James, Walter B., M.D.
1890 Johnes, Edward R.
1890 Janin, Henry.
1890 Jones, Geo. A.
1891 Jaques, W. H., South Bethlehem, Pa.
1891 Jones, Washington, Philadelphia.
1891 Jaffray, Robt.

1869 Kelly, Eugene.
1872 Kendrick, Col. H. L., U.S.A.
1873 Kennan, George. (L. F.) Washington, D. C.
1874 King, Edward.
1874 Kearny, Joseph R.
1874 Kunhardt, Henry R.
1874 Kingsland, Wm. M. (L. F.)
1874 Kalbfleisch, Charles H.
1874 Keck, Thomas.
1876 Knauth, Percival. (L. F.)
1877 King, Clarence. (L. F.)
1878 Kernochan, Jas. Lorillard. (L. F.
1879 Kane, S. Nicholson.
1880 Keene, James R. (L. F.)
1881 Kennedy, John S. (L. F.)
1881 Kane, Grenville. (L. F.)
1881 Kirsch, Louis, Brooklyn, N. Y.
1882 King, Le Roy. (L. F.)
1882 King, George Gordon. (L. F.), Newport, R. I.
1882 King, Vincent C. (L. F.)
1883 Kneeland, Henry T.
1883 Knapp, S. P.
1883 Kerr, Walter.
1883 King, D. H., Jr.
1884 Kountze, Augustus. (L. F.)
1884 Kahn, Dr. Herman.
1885 Keane, Joseph.
1885 Keppler, Rudolph. (L. F.)
1886 Kurtz, William.
1886 Kendall, Edward H.
1886 Kidder, Camillus G. (L. F.)
1886 Karner, W. J., Chicago, Ill.
1887 Knight, George T. (L. F.)
1887 Kevan, William.
1887 Knox, John Jay.
1888 Kelly, Edward. (L. F.)
1888 Kissel, Gustav E.
1888 Kellogg, Charles, Athens, Pa.
1888 Kennedy, H. Van Rensselaer.
1889 Kaufmann, S. H., Washington, D. C.
1889 Koch, Peter, Bozeman, Montana.
1889 Keogh, Martin J., Pelham, N. Y.
1889 Kimball, F. J. (L. F.) Philadelphia.
1889 Kobbe, Walter.
1890 Kempton, C. W., Brooklyn.
1891 Kissel, Rudolph H.

1852 Livingston, Cambridge. (L. F.
1857 Low, Abiel A. (L. F.)
1859 Lathers, Richard. (L. F.)
1869 Lawrence, John S. (L. F.)
1870 Loew, Hon. Frederick W.
1870 Lyman, Edward H. R.
1871 Letson, Robert S.
1872 Libbey, William. (L. F.)

1874 Livingston, Robert J. (L. F.)
1874 Langdon, Walter. (L. F.) Hyde Park, N. Y.
1874 Lorillard, Pierre. (L. F.)
1874 Littlejohn, James, Brooklyn, N. Y.
1874 Le Comte, Joseph.
1874 Lawson, Leonidas M.
1874 Lesher, Stephen R.
1875 Low, Hon. Seth. (L. F.)
1875 Lawrence, George N.
1876 Low, A. Augustus. (L. F.)
1878 Loubat, J. F., LL.D. (L. F.)
1878 Leon, Néstor Ponce de.
1880 Lang, Alexander.
1880 Lee, William H.
1881 Libbey, Prof. William, Jr. (L. F.) Princeton, N. J.
1881 Langdon, Woodbury G. (L. F.)
1881 Little, Hon. Joseph J. (L. F.)
1881 Livermore, Edwin R.
1882 Langdon, Woodbury.
1882 Lamont, Lansing.
1882 Lapham, Lewis H.
1882 Lamborn, Robert H.
1883 Lourie, J.
1883 Lummis, William.
1883 Lounsbery, R. P.
1886 Leete, C. H.
1886 Ludington, C. H. (L. F.)
1886 Lee, Wm. H. L.
1887 Lord, Daniel, Jr.
1887 Littlefield, Frederick M.
1887 Langmann, G., M.D.
1887 Lewis, James F.
1887 Lester, Henry M.
1887 Logan, Walter S.
1887 Lodge, Hon. Henry Cabot, Boston, Mass.
1887 Lovell, John W.
1887 Loomis, Alfred L., M.D.
1887 Lee, Homer.
1888 Lespinasse, George S.
1888 Lancaster, R. A.
1888 Lynch, James D. (L. F.)
1888 Lawton, James M. (L. F.
1888 Lawson, James.
1889 Lewis, Richard V.
1889 Lovell, Frank H., Brooklyn.
1889 Law, Walter W.
1889 Lydig, David.
1889 Lowthian, Thos., Denver, Colo.
1889 Le Roy, Edward A.
1889 Lockman, Jacob K.
1890 Loth, Joseph. (L. F.)
1890 Lamberton, Chas. L.
1890 Livermore, Maj. W. R., U.S.A.
1891 Levin, Mrs. Wm.
1891 Levine, Julius.
1891 Levy, Lewis S.
1891 Littauer, Nathan.
1891 Loewy, Benno.
1891 Leavitt, E. D., Cambridgeport, Mass.
1891 Lewis, Enoch, Philadelphia.
1891 Lansing, Abraham, (L. F.) Albany.
1891 Letts, Thomas.

1853 Moore, George H. (L. F.)
1856 Monroe, Ebenezer, Southport, Ct.
1859 MacMullen, Prof. John.
1859 Morrell, Wm. H. (L. F.)
1859 Moore, Frank. (L. F.)
1863 Moore, W. H. H. (L. F.)
1864 Morton, Hon. Levi P. (L. F.)
1868 Morrison, Henry.
1868 Martin, Isaac P.
1868 Marquand, Henry G. (L. F.)
1870 Marbury, Francis F.
1872 Meyer, F. William.
1872 Marié, Peter. (L. F.)
1873 Moore, C. B.
1874 Morris, Henry L. (L. F.)
1874 Marble, Manton.
1874 Morgan, W. F.
1874 Moir, James.
1874 Morgan J. Pierpont. (L. F.)
1874 McAlpine, David H.
1874 Merrall, William J. (L. F.)

1874 Moulton, Clarence F.
1875 Mitchell, Edward.
1875 Macy, Arthur.
1875 Marcus, Arnold.
1875 Magoun, George C.
1875 Maclay, Moses B.
1875 Martin, Bradley. (L. F.)
1875 Meyer, L. H.
1875 McLanahan, Geo. William.
1876 Mitchell, W. Howard.
1878 Musgrave, Thomas B. (L. F.)
1878 Mason, Lieut. T. B. M., U.S.N. (L. F.)
1879 Marshall, William I., Chicago, Ill.
1879 Mather, Frederick E.
1879 Motz, Ferdinand.
1879 Miller, John Bleecker.
1880 Mills, D. O. (L. F.)
1880 Massey, Wm. M.
1882 Marquand, John P.
1882 Marsh, Caleb P.
1882 McWilliam, John.
1882 Moore, W. T.
1882 Mead, Erastus F.
1882 Markoe, F. H., M.D. (L. F.)
1883 Mackay, Donald. (L. F.)
1883 McCreery, James. (L. F.)
1883 Morgan, E. D.
1883 Mali, Charles.
1884 Moore, Joseph, Jr. (L. F.) Philadelphia, Pa.
1884 Myers, Andrew G.
1884 MacKellar, Wm. (L. F.)
1885 Mackenzie, D. E.
1885 Morison, George S. (L. F.) Chicago.
1886 Muñoz, J. M. (L. F.)
1886 Murray, James B.
1886 Moore, John G.
1886 Moses, Raphael J., Jr.
1886 Macklin, John J.
1886 Morgan, N. Denison.
1886 MacFarland, James.
1887 Morgan, Wm. Fellowes. (L. F.)
1887 Malcolm, William L.
1887 Mitchell, Hubbard W., M.D.
1887 Metcalf, John T., M.D.
1887 Macy, Isaac A.
1887 McCourt, P. J., M.D.
1887 Mack, Jacob W.
1887 Mali, Henry W. T.
1887 Moulton, Franklin W.
1887 Montgomery, Warwick E.
1887 McCready, N. L.
1887 Morton, Alexander L.
1888 Marquand, Henry. (L. F.)
1888 Morgan, Rev. D. Parker.
1888 Mason, Alex. T. (L. F.)
1888 Malcolm, Chas. E.
1888 Moss, Mrs. J. Osborne, Sandusky, O.
1888 Mayo, Dr. Wm. Starbuck.
1888 Myers, Theodore W.
1888 Milhau, Gen. John J. (L. F.)
1888 Mather, Samuel, Cleveland, O.
1888 McGill, Geo. W., Riverdale-on-Hudson, N. Y.
1888 Moore, Cary W.
1888 Martin, Oswald J. (L. F.)
1888 McGee, James.
1888 McKeever, J. Lawrence.
1889 Martin, Rob't C.
1889 McCormick, Hon. R. C., Jamaica, N. Y.
1889 Mead, Edwin H.
1889 McFarland, Wm. W.
1889 McBryde, J. M., Blacksburg, Va.
1889 Mayes, Edward, University, Miss.
1889 Milliken, James, Bellefonte, Pa.
1889 Maitland, Alexander. (L. F.)
1889 Macdonough, James.
1889 Mortimer, W. Y.
1889 Morgan, Wm. H.
1889 Marié, Léon.
1890 Mallory, S. H., Chariton, Iowa.
1890 Mackey, Chas. W., Franklin, Pa.
1890 Montant, Alphonse.
1890 Martin, Chas., M. D.
1890 McCarter, Hon. Thos. N., Newark, N. J.

1890 Mackay, J. W.
1890 Manning, J. Angus.
1891 Mitchell, Grove P.
1891 Meeks, Edwin B.

1874 Newell, John (L. F.), Chicago, Ill.
1874 Niles, William W.
1880 Nelson, William.
1882 Nisbet, John L., Yonkers, N. Y.
1882 Naylor, Joseph.
1882 Nelson, Richard, South Framingham, Mass.
1883 Noble, Charles C. (L. F.) Narragansett Pier, R. I.
1884 Neumoegen, B.
1884 Newberry, Dr. John S.
1885 Nelson, Rev. George Francis.
1886 Neilson, James, New Brunswick, N. J.
1886 Notman, John.
1886 Neftel, W. B., M.D. (L. F.)
1887 Neels, John N.
1887 Noyes, Wm. C.
1889 Nun, R. J., M.D., Savannah, Ga.
1889 Newton, Daniel H., Holyoke, Mass.
1890 Nelson, Wm. S.
1890 Newton, John.
1891 Nicolls, W. J., Philadelphia.
1891 Newkirch, Chas.
1891 Newman, Mrs. Angeline E., Omaha, Neb.

1874 Ottendorfer, Oswald. (L. F.)
1874 Olyphant, Robert M.
1874 Owen, Frederick N.
1875 Ottiwell, John D.
1875 O'Connor, Thomas H. (L. F.)
1875 Opdyke, William S. (L. F.)
1877 O'Gorman, Hon. Richard.
1879 O'Gorman, Richard, Jr.
1879 O'Brien, Thomas S. (L. F.)
1880 O'Shaughnessy, John W. (L. F.)
1881 Oakley, Henry A.
1882 Osborn, W. H. (L. F.)
1882 Oppenheim, Edward L.
1882 Osgood, William H.
1883 O'Donohue, Jos. J.
1886 O'Brien, Hon. Morgan J.
1887 Oldham, J. Leslie.
1887 Ogden, William B. (L. F.)
1888 Oakes, T. F. (L. F.)
1889 Openhym, Wm.
1889 O'Connor, Wm. P.
1889 Orr, Alexander E.
1890 Olcott, Frank Nelson.
1890 O'Dwyer, J., M. D.
1890 Oppenheim, B. Gerson.
1891 Osborne, John H., Auburn, N. Y.

1852 Poor, Henry V. (L. F.)
1857 Pyne, Percy R. (L. F.)
1868 Powers, William P.
1868 Paulison, John P., Tenafly, N. J.
1871 Peabody, Hon. Chas. A.
1872 Parish, Henry. (L. F.)
1874 Peabody, Arthur J.
1874 Penfold, William Hall.
1874 Potter, Hon. Orlando B.
1874 Pondir, John.
1874 Porter, John K.
1874 Packer, Elisha A.
1874 Powers, George J.
1874 Prichard, William M.
1875 Prentice, W. P.
1875 Pfund, Anton.
1875 Porter, Gen. Horace.
1876 Plum, James R.
1878 Parsons, Edwin.
1880 Pinchot, James W.
1880 Powell, Wilson M.
1881 Post, Charles A.
1882 Parsons, Wm. (L. F.)
1882 Parrish, James C. (L. F.)
1882 Pell, Wm. Cruger, Highland Falls, N. Y.
1882 Parsons, Joseph H.
1882 Paton, John.
1882 Platt, Thos. C.

1882 Parsons, John E.
1882 Parsons, Charles.
1882 Peck, Charles M.
1882 Parsons, Mrs. E. (L. F.)
1883 Parks, Robert H. (L. F.)
1884 Post, George B.
1884 Place, George.
1884 Purdy, John F.
1884 Plush, Dr. Samuel M. (L. F.) Philadelphia, Pa.
1885 Post, Wm. Henry. (L. F.)
1885 Parker, George A.
1885 Planten, J. R. (L. F.)
1886 Phœnix, Phillips. (L. F.)
1886 Pearsall, T. W.
1886 Pryer, Chas., New Rochelle, N. Y.
1886 Parris, Edward L.
1887 Phœnix, Lloyd. (L. F.)
1887 Perdicaris, Ion.
1887 Peaslee, Wyllys G.
1887 Peters, George A., M.D.
1887 Parsons, Wm. H.
1887 Putney, Daniel.
1887 Peters, Samuel T.
1887 Parsell, Henry V.
1888 Post, H. A. V.
1888 Perry, William A.
1888 Paine, Robert Treat, Boston, Mass.
1888 Phillips, Wm. D.
1888 Prescott, Geo. B.
1889 Pickering, Prof. Ed. C., Cambridge, Mass.
1889 Prince, Fred'k O., Boston, Mass.
1889 Palmer, S. S.
1889 Peabody, John E., Boston, Mass.
1889 Peck, Charles E.
1889 Philips, Frederic D.
1889 Putnam, Geo. L.
1889 Pell, Walden.
1889 Prince, Col. W. E., U. S. A.
1889 Peabody, Francis H., Boston, Mass.
1889 Pirsson, J. W.
1889 Palmer, Wm. J.
1890 Perkins, W. H.
1890 Purse, D. G., Savannah, Ga.
1890 Plumb, Edward L. (L. F.)
1890 Price, J. Sergeant, Philadelphia.
1890 Porter, Gen. Fitz John.
1890 Potter, Edward Clarkson.
1890 Porter, George E.
1890 Palmer, Dr. H. R.
1890 Peabody, S. Endicott, Boston.
1890 Poor, Henry W.
1891 Phelps, Sheffield, Colorado Springs, Col.
1891 Powell, Deveaux.
1891 Pinkus, Fredk. S.
1891 Peters, Rev. T. M.
1891 Peters, Ed. M.
1891 Porter, Henry Kirke. (L. F.) Pittsburg, Pa.
1891 Prout, H. G.
1891 Pott, James.
1891 Peary, R. E., U. S. N.
1891 Price, J. A.
1891 Pancoast, Archer V.
1891 Potter, Chas.

1883 Quackenbos, John D., M.D.
1883 Quinlin, Leonard G.

1854 Rutherfurd, L. M., LL. D.
1856 Randolph, Anson D. F.
1856 Remsen, William. (L. F.)
1856 Riker, John H.
1861 Rogers, C. B. (L. F.)
1868 Raven, Anton A. (L. F.)
1868 Rose, Cornelius.
1872 Robbins, Chandler. (L. F.)
1874 Reid, Hon. Whitelaw.
1874 Richard, Auguste. (L. F.)
1874 Rogers, H. Livingston.
1874 Riker, William J.
1874 Reynes, Jaime.
1874 Rhoades, John H.
1875 Roosevelt, Clinton.
1875 Read, Gen. J. Meredith. (L. F.) Paris.

1876 Ross, William B.
1878 Roorbach, Orville A. (L. F.)
1878 Rainey, Thomas, M.D., Ravenswood, N. Y.
1880 Robinson, Mrs. John A. (L. F.)
1881 Robbins, George A.
1881 Rhinelander, Frederick W.
1882 Rinehart, E.
1882 Ray, James D.
1882 Robbins, S. H.
1882 Redding, W. E.
1882 Rolston, Roswell G.
1882 Rhinelander, Charles E.
1882 Rathborne, C. L.
1883 Rosenbaum, Albert S.
1883 Richardson, Briton.
1883 Rowland, Thomas F. (L. F.)
1886 Raymond, R. W. (L. F.)
1886 Roys, Geo. B.
1886 Rice, Isaac L. (L. F.)
1886 Ransom, Rastus S.
1887 Remsen, Robert Geo. (L. F.)
1887 Ruggles, James Francis.
1887 Robertson, R. H.
1887 Robb, Hon. J. Hampden. (L. F.)
1887 Rowell, Geo. P. (L. F.)
1887 Rogers, Archibald. (L. F.)
1887 Rice, Henry.
1887 Robertson, T. S., M.D.
1888 Russell, Henry E.
1888 Roe, Alfred.
1888 Ropes, Chas. H.
1888 Rhinelander, Wm.
1888 Renwick, Edward S.
1888 Richter, Dr. C. M., San Francisco, Cal.
1888 Russell, Hon. John E., Leicester, Mass.
1888 Robinson, Wm. M.
1888 Reiley, Robt. T.
1889 Ropes, John C., Boston, Mass.
1889 Rice, Prof. J. M., Annapolis, Md.
1889 Robert, Fred'k.
1889 Rowe, Wm. H., Salt Lake City, Utah.
1889 Roelker, Alfred. (L. F.)
1889 Renauld, Charles.
1889 Roberts, Rev. Wm. C., Lake Forest, Ill.
1889 Reed, J. Van D. (L. F.)
1889 Ribon, Juan G., Jersey City, N. J.
1889 Rogers, N. Pendleton.
1889 Ryan, Thos. F.
1890 Roe, Chas. F., U.S.A.
1890 Reich, Lorenz.
1890 Raymond, Chas. H.
1890 Rea, Geo. Bronson.
1890 Roberts, A. Cookman.
1890 Ryder, Wm. D.
1890 Roosevelt, Robt. B.
1891 Rogers, Henry.
1891 Rushmore, Chas. E.
1891 Rolker, Chas. M.
1891 Robbins, Miss Harriet L.
1891 Raymond, Prof. Geo. L., Princeton, N. J.

1856 Spofford, Paul N.
1856 Schermerhorn, Wm. C.
1856 Sherman, W. Watts.
1859 Schultz, John H. (L. F.)
1860 Stout, Francis A. (L. F.)
1870 Schafer, Samuel M. (L. F.)
1870 Schafer, Simon. (L. F.)
1870 Seligman, Jesse.
1871 Shaler, Gen. Alexander, Ridgefield, N. J.
1872 Steiger, E.
1872 Stuyvesant, Rutherfurd. (L. F.)
1873 Sturges, Frederick.
1873 Spencer, James C.
1873 Scott, Julian. (L. F.) Plainfield, N. J.
1873 Southworth, Alvan S. (L. F.)
1873 Sturgis, Frank K. (L. F.)
1874 Sands, Harry M.
1874 Steinway, William.
1874 Sloan, Samuel.
1874 Schermerhorn, F. Augustus. (L. F.
1874 Stuyvesant, Robert R.

1874 Strong, W. L. (L. F.)
1874 Steward, D. Jackson.
1874 Shethar, Samuel.
1874 Schieffelin, Samuel B.
1874 Sawyer, Warren, Boston, Mass.
1874 Sands, Andrew H.
1874 Schaus, William.
1874 Spinney, Joseph S.
1874 Striker, J. A.
1875 Stanford, William H.
1875 Smith, Lewis Bayard.
1875 Sturges, Henry C.
1875 Stewart, Col. Charles Seaforth, Cooperstown, N. Y.
1875 Schultz, Carl H.
1875 Sanford, Elliott. (L. F.)
1875 Stranahan, J. S. T., Brooklyn, N. Y.
1875 Schiff, Jacob H. (L. F.)
1875 Smith, Augustine.
1876 Smith, Harsen H.
1876 Sibley, Hiram W. (L. F.) Rochester, N. Y.
1876 Spaulding, Henry F.
1876 Stryker, Gen. William S., Trenton, N. J.
1876 Stone, Andros B.
1877 Shearman, William P. (L. F.)
1877 Sanford, Gen. Henry S., Birmingham, Ct.
1877 Sanger, Major Joseph P., U.S.A.
1877 Schaff, Rev. Philip, D.D.
1877 Schuyler, Philip.
1878 Stewart, William Rhinelander.
1878 Sands, William R. (L. F.)
1878 Smith, S. Newton.
1878 Sabla, Theodore de Joly de.
1879 Stevens, Frederick W. (L. F.)
1879 Smith, E. Reuel. (L. F.)
1879 Smith, Herbert H., Brooklyn, N. Y.
1879 Shields, Prof. Charles W., Princeton, N. J.
1879 Stetson, Francis Lynde.
1880 Southwick, Henry K. (L. F.)
1882 Sass, Dr. Luis F.
1882 Schuyler, Spencer D. (L. F.)
1882 Sayre, Lewis A., M.D. (L. F.)
1882 Scott, George S.
1882 Skidmore, Wm. L.
1882 St. John, W. P.
1882 Scribner, Charles.
1883 Schermerhorn, Charles A.
1883 Simpson, George E.
1883 Stone, Sumner R.
1883 Sinclair, John. (L. F.)
1883 Spence, Lewis H.
1883 Smith, William Alex.
1883 Smith, Henry N. (L. F.) Trenton, N. J.
1883 Stern, Louis.
1883 Sanger, Wm. Cary.
1883 Scott, Rufus L.
1883 Sorzano, Julio F.
1883 Spicer, Elihu, Jr. (L. F.)
1884 Schley, J. Montfort, M.D.
1884 Shannon, Robert H.
1884 Stokes, James.
1885 Storer, Albert.
1885 Sturgis, Russell.
1885 Stanton, S. Franklin.
1885 Storm, Walton.
1885 Schmelzel, Wm. R.
1886 Stevens, Rev. C. Ellis, LL. D., Brooklyn.
1886 Sherman, Prof. O. T., Cambridge, Mass.
1886 Sherman, George. (L. F.)
1886 Starr, Egbert.
1886 Satterlee, F. Le Roy, M. D.
1886 Sturgis, F. R., M. D.
1886 Smith, Edwin B.
1887 Stewart, Lispenard.
1887 Sutton, Rev. J. Ford, D. D.
1887 Schell, Robert.
1887 Swain, George F., Passaic, N. J.
1887 Sawyer, Lieut. J. Estcourt, U. S. A.
1887 Seligman, Dewitt J.
1887 Smith, Jas. Rufus.
1887 Smith, Nathaniel S.

1887 Sellew, T. G.
1887 Satterthwaite, Thos. E., M. D.
1887 Stetson, George W. (L. F.)
1887 Satterlee, S. K., Rye, N. Y.
1887 Sterry, George E.
1887 Shortall, John G., Chicago, Ill.
1887 Serrell, Gen. Edward W.
1887 Stickney, Austin.
1887 Stevens, George T., M. D.
1888 Stephens, Benjamin.
1888 Stickney, Albert.
1888 Stuart, Inglis.
1888 Smith, Nelson.
1888 Sprague, Henry E.
1888 Salisbury, Stephen (L. F.) Worcester, Mass.
1888 Smith, A. Cary.
1888 Stott, Frank H. (L. F.) Stottville, N. Y.
1888 Starbuck, Wm. H.
1888 Smythe, Rev. Hugh, S. Orange, N. J.
1888 Sheldon, Edwin B.
1888 Schell, Edward.
1888 Skiddy, Wm. W., Stamford, Conn.
1888 Sherman, Charles A.
1888 Schultze, John S. (L. F.)
1888 Sturgis, Robert.
1889 Sackett, Chas. A.
1889 Smith, Philip Sherwood, Buffalo, N. Y.
1889 Squibb, E. R., Brooklyn.
1889 Smith, Prof. Chas. Sprague.
1889 Smith, Pierre J.
1889 Steinbrügge, E.
1889 Sellers, Wm., Philadelphia.
1889 Spies, Frances. (L. F.)
1889 Screven, Col. John, Savannah, Ga.
1889 Sooysmith, Chas.
1889 Smith, Henry A.
1889 Sutton, Woodruff.
1889 Steel, W. G., Portland, Oregon.
1889 Sackett, Henry W.
1889 Straus, Isidor.
1889 Sullivan, Arthur T.
1889 Struthers, Joseph.
1890 Sherman, Gordon E., St. Louis, Mo.
1890 Schenck, N. Pendleton.
1890 Schwarzmann, A.
1890 Sewell, Wm. J., Camden, N. J.
1890 Snow, Elbridge G., Jr.
1890 Sprague, John W., Tacoma, Wash.
1890 Smith, Sir Donald A. (L. F.) Montreal, Canada.
1890 Simonson, Wm. H.
1890 Swan, Samuel, M. D.
1890 Sands, Robert A., M. D.
1890 Schell, Francis.
1890 Schernikow, Ernest.
1890 Smith, Eugene.
1891 Shimmel, Capt. A.
1891 Siddell, Cornelius V.
1891 Stevens, Chas. E., Worcester, Mass.
1891 Stanton, John.
1891 Suckley, Robt. B. (L. F.)
1891 Stieglitz, Edward.
1891 Sanford, David C., New Haven.

1856 Tiffany, Charles L.
1856 Townsend, Randolph W.
1868 Taylor, Douglas.
1870 Thomson, James.
1872 Tower, Gen. Z. B., U. S. A.
1874 Thompson, David G. (L. F.)
1874 Tiemann, Peter C.
1874 Taylor, Alfred J.
1874 Turner, Herbert B.
1875 Taintor, Charles M.
1875 Toel, William.
1875 Terbell, Henry S.
1876 Terry, Rev. Roderick.
1877 Tillinghast, William H.
1877 Talcott, James. (L. F.)
1879 Turnbull, Robert J., Morristown, N. J.
1880 Tailer, William H.
1881 Thompson, R. H., Troy, N. Y.

1882 Thurber, H. K.
1882 Taber, Henry M. (L. F.)
1882 Thomson, Eugene.
1882 Tailer, Edward N. (L. F.)
1882 Terry, John T. (L. F.)
1882 Taintor, Giles E.
1883 Twombly, Hamilton McK.
1883 Trumbull, Rev. H. Clay, D.D., Philadelphia, Pa.
1883 Thalmann, Ernest.
1884 Taltavall, Wm. A.
1884 Turner, J. Spencer.
1884 Thoron, Joseph.
1885 Tone, T. Wolfe.
1885 Tiffany, Rev. C. C., D.D.
1885 Turnure, Lawrence.
1886 Thorne, Jonathan.
1887 Turnbull, William.
1887 Talbot, Charles N.
1887 Ten Eyck, Sandford R.
1887 Talmadge, Henry.
1887 Thompson, Frederic F. (L. F.)
1887 Townsend, Howard.
1888 Thompson, W. Gilman, M.D.
1888 Twombly, Horatio N.
1888 Tompkins, Wm. W.
1888 Tresidder, John R.
1888 Taylor, C. Fayette, M.D.
1889 Taylor, Franklin E.
1889 Tuckerman, Joseph, Newport, R. I.
1889 Topping, Henry S.
1889 Teft, F. Griswold.
1889 Townsend, Alfred M.
1889 Tuck, Somerville P.
1889 Thompson, Rob't M.
1889 Tatham, Chas.
1889 Thaw, Wm., Jr., Allegheny, Pa.
1889 Throop, Enos T.
1889 Trask, Chas. H.
1890 Turner, Elisha, Torrington, Conn.
1890 Thorp, John R.
1890 Thorne, Samuel.
1890 Tyng, T. Mitchell.
1891 Teller, A. H.
1891 Toplitz, L.
1891 Thaw, Benjamin, Pittsburg, Pa.
1891 Thomson, John.
1891 Tobey, Gerard C.
1891 Toop, George H.
1891 Taber, Chas.
1891 Townsend, Jas. B.

1884 Utter, Dr. Francis A.
1888 Uhl, Edward. (L. F.)
1889 Underhill, A. M.
1890 Urban, Adolph.
1891 Ulmann, Ludwig.
1891 Ullmann, Emanuel S.

1854 Viele, Gen. Egbert L.
1868 Van Santvoord, C.
1870 Van Brunt, Hon. Chas. H. (L. F.)
1875 Van Buren, John D.
1875 Valentine, Lawson.
1875 von Post, H. C. (L. F.)
1875 Vanderpoel, A. Ernest.
1876 Van Hoesen, Hon. George M.
1876 Van Brunt, Cornelius.
1877 Vanderbilt, Cornelius. (L. F.)
1878 Vanderbilt, William K. (L. F.)
1880 von Hesse, Christian.
1884 Van Siclen, Geo. W.
1885 Valentine, Henry C.
1886 Valenzuela, Enrique.
1887 Voorhees, Charles H., M.D., New Brunswick, N. J.
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1887 Verastegui, Alberto, Havana, Cuba.
1887 Van Slyck, Geo. W. (L. F)
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1888 Villard, Henry.
1888 Ver Planck, Wm. G.
1889 Vanderbilt, Geo. W. (L. F.)
1889 Van Devanter, Willis, Cheyenne, Wyoming.
1890 Valentine, Ferdinand C., M.D.
1890 Vose, Geo. H.

1891 Vogel, Heyman.
1891 Van Winkle, Edgar B., Lakewood, N. J.

1854 Webb, William H.
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1870 Webster, Sidney.
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1870 Ward, T. W.
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1873 Wiener, Joseph, M.D. (L. F.)
1874 Weyman, Charles S.
1874 Wheeler, Everett P.
1874 Wetmore, Hon. George P. (L. F.)
1875 Work, J. Henry.
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1875 Whitehead, Comdr. Wm., U.S.N.
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1886 Wright, Wm. Phillips.
1886 Walsh, Richard M. L.
1886 White, Hon. S. V. (L. F.)
1886 Wiman, Erastus.
1886 Walker, John A., Jersey City, N. J.
1886 Whitehouse, J. H.
1886 White, Horace.
1886 Watson, Wm. P.
1886 Ward, John E.
1887 White, Julian Leroy. (L. F.) Baltimore.
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1887 Wheelock, George G., M.D.
1887 White, Andrew J.
1887 White, Henry, London, Eng.
1887 Whitely, James.
1887 Wilcox, Stephen.
1887 Westcott, Clarence L.
1887 Welling, W. Brenton.
1888 West, Hon. George, Ballston Spa, N. Y.
1888 Whitehouse, W. Fitzhugh.
1888 Wynkoop, Francis S.
1888 Walsh, F. J.
1888 Witherbee, Frank S.
1888 Wynkoop, G. H., M.D.
1888 West, Frederick T.
1888 Woodward, Jas. T. (L. F.)
1888 Wendell, Ten Eyck.
1888 Worthington, Robt. H.
1888 Wetmore, Edmund.
1888 Winslow, Daniel.
1889 Warner, Lucien C.
1889 Wood, Wallace.
1889 Weber, Christian.
1889 Warfield, Ethelbert D., Oxford, O.
1889 Webster, Harrison E., Schenectady, N. Y.
1889 Waterbury, John I.
1890 Williams, Norman. (L. F.) Chicago.
1890 Weir, Chas. G.
1890 Wadsworth, Herbert. (L. F.) Avon, N. Y.
1890 Wells, Edward, Jr.
1891 Wolcott, Henry Roger, Denver, Colo.

1891 Wise, Charles.
1891 Whitney, Hon. Milton B., Westfield, Mass.
1891 Walker, Jno. Brisben.
1891 White, Miss Georgiana.
1891 Waters, Edward Emerson.

1874 Young, Mason.
1888 Young, Edward F. C., Jersey City, N. J.
1891 Young, Frederick S., Troy, N. Y.
1891 Young, Edward L.

1875 Zollikoffer, Oscar.
1884 Zabriskie, Andrew C. (L. F.)

FELLOWS AND MEMBERS DECEASED, 1891.

Alexander Mc L. Agnew, October 16.
Hon. Henry Wilder Allen, October 13.
N. P. Bailey, October 12.
Hon. George Bancroft, January 17.
John Banvard, May 16.
John Baird, October 17.
Lawrence Barrett, March 20.
Charles F. Chickering, March 23.
Col. F. A. Conkling, September 18.
Rev. Howard Crosby, D.D., March 29.
Richard J. Dodge, August 2.
Edward C. Donnelly, January 4.
Eugene Du Bois, June 26.
John P. Fellows, April 13.
Elias L. Frank, December 23.
Hon. Melbourne H. Ford, April 20.
Clinton Gilbert, November 29.
George Bird Grinnell, December 19.
Caleb S. Green, February 20.
Leonard G. Hun, March 11.
John L. Hardee, March 12.
Samuel C. Harriot, April 24.
Oswald Jackson, November 30.
Col. H. L. Kendrick, U. S. A., May 24.
Charles H. Kalbfleisch, June 17.
Edwin R. Livermore, October 4.
Robert J. Livingston, February 22.
Nathan Littauer, May 8.
Arthur Macy, April 14.
Gen. John J. Milhau, May 8.
W. Y. Mortimer, December 4.
J. Angus Manning, June 9.
William P. Powers, September 27.
Pedro II, ex-Emperor of Brazil, Dec. 4.
Gen. Henry S. Sanford, May 21.
William H. Stanford, July 5.
Lawson Valentine, May 5.

List of Foreign and Domestic Geographical and other Scientific Bodies with which this Society is in Communication and Constant Exchange of Publications.

ALASKA:
Alaskan Society of Natural History and Ethnology, Sitka.

ARGENTINE REPUBLIC:
Academia Nacional de Ciencias, Córdoba.
Instituto Geográfico Argentino, Buenos-Aires.
Sociedad Geográfica Argentina, Buenos-Aires.

AUSTRALIA:

Philosophical Society of North Queensland, Brisbane.
Royal Geographical Society of Australasia, Queensland Branch, Brisbane.
Royal Society of Queensland, Brisbane, Queensland.
Queensland Museum, Brisbane.
Melbourne Observatory, Melbourne, Victoria.
Royal Society of Victoria, Melbourne, Victoria.
Public Library, Museum, and National Gallery, Melbourne.
Department of Mines, Sydney, N. S. W.
Linnean Society of New South Wales, Sydney, N. S. W.
Royal Society of New South Wales, Sydney, N. S. W.

AUSTRIA:

Ferdinandeum, Innsbruck.
Akademie der Wissenschaften, Krakau.
Gesellschaft der Wissenschaften, Prague.
K. K. Akademie der Wissenschaften, Vienna.
K. K. Geographische Gesellschaft, Vienna.
K. K. Geolog. Reichsanstalt, Vienna.
K. K. Naturhist: Hofmuseum, Vienna.
K. K. Militär-Geographisches Institut, Vienna.

BELGIUM:

Société Belge de Géographie, Antwerp.
Académie Royale de Belgique, Brussels.
Société Royale Belge de Géographie, Brussels.

BRAZIL:

Bibliotheca Nacional, Rio de Janeiro.
Instituto Historico, Geographico, e Ethnographico do Brazil, Rio de Janeiro.
Museu Nacional, Rio de Janeiro.
Observatorio, Rio de Janeiro.
Secção da Sociedade de Geographia de Lisboa no Brazil, Rio de Janeiro.
Sociedade de Geographia, Rio de Janeiro.
Comm: Geog: e Geologica da Prov: de S. Paulo, S. Paulo.

CALIFORNIA:

California Historical Society, Berkeley.
University of California, Berkeley.
Historical Society of Southern California, Los Angeles.
California Academy of Sciences, San Francisco.
Geographical Society of the Pacific, San Francisco.
Mercantile Library Association, San Francisco.
State Mining Bureau, San Francisco.

CANADA:

Nova Scotian Institute of Science, Halifax.
Hamilton Association, Hamilton, Ontario.
Geological and Natural History Survey of Canada, Ottawa.
Department of the Interior, Topographical Surveys Branch, Ottawa.

Royal Society of Canada, Ottawa.
Geographical Society, Quebec.
Literary and Historical Society, Quebec.
Canadian Institute, Toronto.

CHILE:

Der Deutsche Wissenschaftliche Verein, Santiago.
Observatorio Astronómico, Santiago.
Oficina Central de Estadística, Santiago.
Oficina Hidrográfica de Chile, Santiago.

CHINA:

China Branch of the Royal Asiatic Society, Shanghai.
Statistical Department, Inspectorate-General Imp. Maritime Customs, Shanghai.

COLORADO:

Colorado Scientific Society, Denver.

CONNECTICUT:

Scientific Association, Meriden.
American Oriental Society, New Haven.
Connecticut Academy of Arts and Sciences, New Haven.
Library of Yale University, New Haven.
Ferguson Library, Stamford.

COSTA RICA:

Oficina de Dep. y Canje de Publicaciones, San José.
La Gaceta, Diario Oficial, San José.

DENMARK:

Royal Danish Academy of Sciences, Copenhagen.
Royal Danish Geographical Society, Copenhagen.

DISTRICT OF COLUMBIA:

Board on Geographic Names, Washington.
Philosophical Society, Washington.
Smithsonian Institution, Washington.
Department of State, Washington.
Bureau of Education, Washington.
Hydrographic Office, Washington.
Bureau of American Republics, Washington.
Coast and Geodetic Survey, Washington.
Bureau of Ethnology, Washington.
Geological Survey, Washington.
Library of Congress, Washington.
National Geographic Society, Washington.
Metropolitan Club, Washington.
Office of Library and War Records, Navy Department, Washington.
Chief of Engineers, War Department, Washington.

EGYPT:

- Société Khédiviale de Géographie, Cairo.

ENGLAND.

- Royal Cornwall Polytechnic Society, Falmouth.
- Literary and Philosophical Society, Liverpool.
- Royal Colonial Institute, London.
- Royal Institution, London.
- Royal Geographical Society, London.
- Royal Society, London.
- Meteorological Office, London.
- Statistical Society, London.
- Victoria Institute, London.
- Literary and Philosophical Society, Manchester.
- Manchester Geographical Society, Manchester.
- Statistical Society, Manchester.
- Tyneside Geographical Society, Newcastle-upon-Tyne.
- Royal Geological Society, Penzance.
- Yorkshire Philosophical Society, York.

FRANCE:

- Société d'Etudes Scientifiques, Angers.
- Académie des Sciences et Belles Lettres, Angers.
- Société de Géographie Commerciale, Bordeaux.
- Société des Sciences Naturelles, Cherbourg.
- Union Géographique du Nord de la France, Douai.
- Société de Géographie Commerciale, Havre.
- Société de Géographie, Lille.
- Société de Géographie, Lyons.
- Société de Géographie, Marseilles.
- Société Languedocienne de Géographie, Montpellier.
- Société de Géographie, Paris.
- Société de Géographie Commerciale, Paris.
- Société de Topographie, Paris.
- Soc. Académique Indo-Chinoise, Paris.
- Soc. d'Etudes Japonaises, Paris.
- Société de Géographie, Rochefort.
- Société Normande de Géographie, Rouen.
- Société de Géographie, Saint-Nazaire.
- Société Académique Franco-Hispano-Portugaise, Toulouse.
- Société de Géographie, Toulouse.
- Société de Géographie, Tours.
- Société Polymathique du Morbihan, Vannes.

GERMANY:

- Kolonialgesellschaft, Berlin.
- Kaiserl: Statist: Amt, Berlin.
- Königl; Preuss: Statist: Bureau, Berlin.

Gesellschaft für Erdkunde, Berlin.
Königl. Preuss: geologisch: Landesanstalt, Berlin.
Geographische Gesellschaft, Bremen.
Geographische Gesellschaft, Carlsruhe.
Verein für Erdkunde, Darmstadt.
Verein für Erdkunde, Dresden.
Naturforschende Gesellschaft, Emden.
Physikal. Verein, Frankfurt-a-M.
Verein für Geog. und Statistik, Frankfurt-a-M.
Naturwiss: Verein des Reg.-Bezirks, Frankfort-a-O.
Naturforschende Gesellschaft, Görlitz.
K. Gesellschaft der Wissenschaften, Göttingen.
Geographische Gesellschaft, Greifswald.
Verein für Erdkunde, Halle-a-S.
Leopoldino Carolina Akademie, Halle-a-S.
Geographische Gesellschaft, Hamburg.
Geographische Gesellschaft, Hanover.
Geographische Gesellschaft, Jena.
Naturwiss. Verein für Schleswig-Holstein, Kiel.
K. Gesellschaft der Wissenschaften, Leipzig.
Verein für Erdkunde, Leipzig.
Geographische Gesellschaft, Lübeck.
Verein für Erdkunde, Metz.
Akademie der Wissenschaften, Munich.
Geographische Gesellschaft, Munich.
Verein für Handelsgeographie, Stuttgart.
Verein für Vaterländ. Naturkunde, Stuttgart.
Verein für Naturkunde, Wiesbaden.

GUATEMALA:
Direccion General de Estadística, Guatemala.
Ministerio de Fomento, Guatemala.

HUNGARY:
Gewerbeschule, Bistritz.
Hungarian Academy of Sciences, Buda-Pest.
Hungarian Geog. Society, Buda-Pest.
Royal Hungarian University, Buda-Pest.
Verein für Siebenbürg: Landeskunde, Hermanstadt.
Ungar: Karpathen-Verein, Igló.

ILLINOIS:
Chicago Historical Society, Chicago.

INDIANA:
Brookville Society of Natural History, Brookville.

IOWA:
Academy of Natural Sciences, Davenport.
Historical Society, Iowa City.

IRELAND:

Natural History and Philosophical Society, Belfast.
Royal Dublin Society, Dublin.

ITALY:

Sez. Fiorentina della Società Africana, Florence.
R. Biblioteca Naz. Centrale, Florence.
Società d'Esplorazione Commerciale, Milan.
Società Americana d'Italia, Naples.
Società Africana d'Italia, Naples.
Istituto Cartografico Italiano, Rom.
Ministerio di Agricoltura, Industria e Commercio, Rome.
Biblioteca Nazionale Centrale Vittorio Emanuele, Rome.
Società Geografica Italiana, Rome.
British and American Archæological Society, Rome.
Direzione Gen. della Statistica, Rome.
Cosmos, Turin.

JAPAN:

Asiatic Society, Yokohama.
Geographical Society, Tokyo.
Imperial University of Japan, Tokyo.
Seismological Society, Tokyo.

JAVA:

Bataviaasch Genootschap van Kunsten en Wetenschappen, Batavia.

MARYLAND:

Naval Institute, Annapolis.

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Appalachian Mountain Club, Boston.
State Library, Boston.
Massachusetts Historical Society, Boston.
Public Library, Boston.
American Statistical Association, Boston.
Peabody Museum, Cambridge.
Library of Harvard University, Cambridge.
American Association for the Advancement of Science, Salem.
Essex Institute, Salem.
Peabody Academy of Science, Salem.
American Antiquarian Society, Worcester.
Society of Antiquity, Worcester.

MEXICO:

Museo Nacional, Mexico.
Observatorio Meteorol: Magn. Central, Mexico.
Sociedad Mexicana de Geografía y Estadística, Mexico.
Sociedad Científica "Antonio Alzate," Mexico.
Ministerio de Fomento, Mexico.
Observatorio Astronómico Nacional de Tacubaya, Mexico.

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- Public Library, Detroit.

MINNESOTA:
- Academy of Natural Sciences, Minneapolis.
- Geol. and Nat. History Survey, University, Minneapolis.
- Minnesota Historical Society, St. Paul.

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- Washington University, St. Louis.

NEBRASKA:
- State Historical Society, Lincoln.
- University of Nebraska, Lincoln.

NETHERLANDS:
- Aardrijks: Genootschap, Amsterdam.
- K. Instituut voor de Taal-L-en V-van Nederlandsch-Indië, The Hague.
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- U. S. Military Academy, West Point.

NEW ZEALAND:
- The New Zealand Institute, Wellington.

NORWAY:
- Norse Geographical Society, Christiania.
- Royal University, Christiania.
- Central Bureau of Statistics, Christiania.

OHIO:
- Cincinnati Society of Natural History, Cincinnati.
- Western Reserve and Northern Ohio History Society, Cleveland.
- Library of Oberlin College, Oberlin.

PENNSYLVANIA :

Academy of Natural Sciences, Philadelphia.
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Franklin Institute, Philadelphia.
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PERU :

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Commissão Central Permanente de Geographia, Lisbon.
Sociedade de Geographia, Lisbon.
Ministerio de Marinha e Ultramar, Lisbon.

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Société de l'Histoire Naturelle, Kazan.
Société des Naturalistes, Kief.
Museum of Applied Sciences, Moscow.
Section Géographique de la Soc. Imp. des Amis des Sciences Naturelles, Moscow.
Société des Naturalistes de la Nouvelle Russie, Odessa.
Orenburg Section of the Imp. Russ. Geographical Society, Orenburg.
Imperial Russian Geographical Society, St. Petersburg.
Imperial Academy of Sciences, St. Petersburg.
Caucasian Section of the Imp. Russ. Geog. Society, Tiflis.

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Royal Society, Edinburgh.
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Philosophical Society, Glasgow.

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Observatorio Meteorológico de Manila, Filipinas.

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Central Bureau of Statistics, Stockholm.
Society for Anthropology and Geography, Stockholm.
Société Royale des Sciences, Upsal.

SWITZERLAND :

Mittelschweizer : Geog :-Comm : Gesellschaft, Aarau.
Hist. und Antiq. Gesellschaft, Basle.

Geographische Gesellschaft, Bern.
Société de Géographie, Geneva.
Soc. Neuchâteloise de Géographie, Neuchâtel.
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Antiquarische Gesellschaft, Zurich.

TENNESSEE:
State Board of Health, Nashville.

WISCONSIN:
State Historical Society, Madison.

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PURCHASES.

Other Countries, by Maj. W. Morrison Bell, 2 vols. 8vo, London, 1872; Journal of the Swedish Embassy, 1653 and 1654, by Sir Bulstrode Whitelock, 2 vols. 4to, London, 1772; Spain, by S. P. Scott, 8vo, Philadelphia, 1886; Voyage of Pyrard de Laval to the East Indies (Hakluyt Soc.) vol. 2, pt. 2, London, 1890; Atlas of Metropolitan District New York, by J. Bien and C. C. Vermeule, folio, New York, 1891; Emin Pasha and the Rebellion at the Equator, by A. J. Mounteney–Jephson, 8vo, London, 1890; Travels in Africa, 1875–1878, by Wilhelm Junker, 8vo, London, 1890; Churches of Constantine at Jerusalem, tr. by J. H. Bernard, 8vo, London, 1891; Life of Ferdinand Magellan, by F. H. H. Guillemard, 8vo, London, 1890; Mungo Park and the Niger, by Joseph Thomson, 8vo, London, 1890; Palestine, by Maj. C. R. Conder, 8vo, London, 1889; Theory of the Glaciers of Savoy, by le Chanoine Rendu (tr.) 8vo, London, 1874; Amsterdam et Venise, par H. Havard, 8vo, Paris, 1876; Travels in the Caucasus, Persia and Turkey in Asia, by Max von Thielmann, 2 vols., 8vo, London, 1875; History of the United States, Administrations of Jefferson and Madison, 9 vols., 8vo, New York, 1890; Nouvelle Géographie Universelle, par E. Reclus, vol. 17, 8vo, Paris, 1891; Reisebilder aus Liberia, von J. Büttikofer, vol. 2, Leiden, 1890; History of Jews of Spain and Portugal, by E. H. Lindo, 8vo, London, 1848; One Year in Sweden, by Horace Marryat, 2 vols., 8vo, London, 1862; Two Years in Switzerland, by F. Bremer, 2 vols., 8vo, London, 1861; The Chinese As They Are, by G. Tradescant Lay, 8vo, London, 1841; Journey to Falls of the Cavery, by Lieut. H. Jervis, 8vo, London, 1834; Travels from Vienna through Lower Hungary, by Richard Bright, 4to, London, 1818; Travels in France and Italy, 1720 and 1722, by E. Wright, 4to, London, 1730; Paulli Merulae Cosmographiae Generalis Libri Tres, 4to, Lugduni Batavorum, 1605; Description of Latium, 4to, London, 1805; A Tour through Greece, Turkey and Italy, by P. E. Laurent, 4to, London, 1821; A Voyage to Madeira, Teneriffe, etc., by W. R. Wilde, 2 vols., 8vo, Dublin, 1840; A Tour in the Southern Provinces of Naples, by R. Keppel Craven, 4to, London, 1821; Sicily and its Islands, by Capt. W. H. Smyth, 4to, London, 1824; The Great Cities of the Middle Ages, by T. A. Buckley, 8vo, London, 1853; With Stanley's Rear-Guard, by J. Rose Troup, 8vo, London, 1890; Life of Ed. Musgrave Barttelot, by Wm. Geo. Barttelot, 8vo, London, 1890; The Mongols of Persia, by H. H. Howorth, 8vo, London, 1888; Claudius Ptolemy and the Nile, by Wm. Desborough Cooley, 8vo, London, 1854; Five Years with Congo Cannibals, by Herbert Ward, 8vo, London, 1890; The Genesis of the United States, by Alexander Brown, 2 vols., 8vo, Boston, 1891; Treatise on British Fisheries, by S. 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Lucas, 4to, London, 1891; Catalogue of the American Books in the British Museum, by Henry Stevens, 8vo, London, 1866; Benjamin Franklin's Life and Writings, by Henry Stevens, 8vo, London, 1881; Paresçer o Determinaciõ de los señores, (1541) 4to, London, 1854; Carta de Don frey Bartolõe de las Casas (1554) 4to, London, 1854; Memorial de Don Diego Colon (1520) 4to, London, 1854; Carta del señor Don Frey Bartolome (1520) 4to, London, 1854; Carta de Hernando Cortes (1542) 4to, Londres, 1854; Carta de Amonestacion del obpo (1545) 4to, London, 1854; Rome, by Francis Wey, 4to, New York, 1873; History of Georgia, by Wm. Bacon Stevens, 2 vols., 8vo, New York, 1847; Origin and Growth of Religion as Illustrated by the Religion of Ancient Egypt, by P. Le Page Renouf, 12mo, New York, n. d.; The Sanative Influence of Climate, by Sir James Clark, 12mo, London, 1846; Bishop Burnet's Travels, 12mo, London, 1750; An Exact Description of Ireland, by Lawrence Eachard, 12mo, London, 1691; Ruins of Ancient Cities, by Chas. Bucke, 2 vols., 8vo, London, 1840; Waikna: Adventures on the Mosquito Shore, by S. A. Bard, 12mo, London, 1855; Sketches in Sicily, Italy and France, by John James, 12mo, Albany, 1820; North American and West Indian Gazetteer, 12mo, London, 1776; Lake George and Lake Champlain, by B. C Butler, 12mo, Albany, 1868; Traveller's Directory: New York to Washington, by S. S. Moore and T. W. Jones, 8vo, Philadelphia, 1802; Account of Newton's Philosophical Discoveries, by Colin Maclaurin, 4to, London, 1748; Scenes in Spain, 12mo, New York, 1837; Tour of Duty in California, by J. W. Revere, 12mo, New York, 1849; California Illustrated, by J. M. Letts, 8vo, New York, 1852; The Geographical Works of Sadik Isfaháni, edited by Sir W. 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Total Eclipse of the Sun, 1889.

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Exploração dos rios Itapetininga e Paranapanema—Boletim da Commissão, Nos. 4, 5, 6, 7.

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The Mountains of Oregon, by W. G. Steel, 8vo, Portland, 1890.

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Reports on Trade, Forests, Iron, Industry, Finances, etc.: 67 documents.

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A Historical Inquiry concerning Henry Hudson, by J. Meredith Read, Jr., 8vo, Albany, 1866; Report 1944, Senate, 51st Congress, 2d Session and Executive Document No. 5, 8vo, Washington, 1891; Le Tour du Monde, vols. for 1880–1890 (11 years) 4to, Paris; La Sphère: L'Heure Universelle, (map by Bouthillier de Beaumont) Genève, 1891; Map of the Missions in Africa, 4 sheets, London (1891).

From E. E. Taché, Assistant Commissioner of Crown Lands, Quebec:

Labrador Boundary Map, Ottawa, 1890.

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Sculptured Anthropoid Ape Heads, by James Terry, 4to, New York, 1891.

From Col. H. R. Thuillier, R. E., Surveyor-General of India:

The Great Trigonometrical Survey of India, vols. 11, 12, 13 and 14, 4to, Dehra Dun, 1890.

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Journal, vol. xviii, Pt. 2, vol. xix, Part 1.

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Nova Acta Reg. Soc. Scientiarum 3 Ser. vol. 14, Fasc. 2.

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Year Book, 1890.

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Jahrbuch XL, Heft 3 und 4, XLI, Heft 1, Verhandlungen, Nos. 14–18, 1890, Nos. 1–14, 1891.

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Extracts Relating to the Origin of the American Navy, Compiled by Henry E. Waite, 8vo, Boston, 1890.

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Forestry Bulletin, No. 5; Album Agricultural Statistics, 1891; Album Agricultural Graphics, 1891.

From the Department of State, Washington:

Reports of Consuls, Nos. 122–132; Special Consular Reports: Olive Culture in the Alpes Maritimes; On Beet Sugar; On Foreign Streets and Highways; On Foreign Port Regulations (and

Titles, vols. 2, 3, 4,); On Coal and Coal Consumption in Spanish America; On Canals and Irrigation in Foreign Countries.

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Bulletin, vol. 8; Report, 1887.

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60 Atlas Sheets, Topographical Map of the United States; Bulletins, Nos. 62, 65, 67–81.

From the U. S. Hydrographic Office, Washington:

Pilot Chart of the North Atlantic, Jan.—Dec. 1891, and 3 Supplements: Annual Report, Hydrographer, to June 30, 1891: (No. 97) Telegraphic Determinations of Longitudes 1888–1889–1890. (No. 73) Davis Strait, Baffin Bay, etc. (No. 41a) Reported Dangers in the South Pacific. (No. 96) Coast of British Columbia, (No. 64) Gulf Coast of the United States, (No. 99) Nova Scotia, Bay of Fundy, etc. Supplement No. 2, Reported Dangers in the North Pacific. Supplement No. 2, English Channel. Chart 1242, Island of Nippon, Yokohama Bay: 1244, Hawaiian Islands, Harbors of Maui: 1243, China Sea, Singapore Strait, Singapore Roads: 1247, North America, United States and Canada, Passamaquoddy Bay and Approaches: 1245, West Indies, Island of Curaçao, Spanish Water, Spanish Haven and Carácas Bay: 1246, West Coast of Africa, Cape Juby to Cape Cantin, with Madeira and the Canaries: 1248, The Marshall Islands, Ebon Atoll, Arno Atoll: 1249, Chile, Mejillones del Sur Bay, Angamos Point and San Luciano Anchorages: 1250, Guatemala, Port Livingston, Gulf of Honduras: 1251, Hawaiian Islands, Harbors of Kauai: 1252 Hawaiian Islands, Harbors of Oahu: 1253, South America, West Coast, Harbors, Coast of Chile: 1256, China Sea, Formosa, Kelung Harbor: 1257, Hawaiian Islands, Harbors of Hawaii: 1102, East Coast of Newfoundland, Cape Bonavista to Cape St. Mary: 1254, China Sea, Hong Kong Harbor: 1255, China, Wusung River, Shanghai Harbor: 1261, West Indies, Island of St. Lucia: 1259, Harbors on Coast of Chile: 1263, Korea, South Coast, Crichton Group, Paön Do, Monocacy Anchorage: 1264, Hawaiian Islands, Oahu, Port Waianae: 1260, North Pacific Ocean, Palao (Pelew) Islands: 1265, South America, Chile, Tocopilla Road (Algodonales Bay): 1269, West Indies, Haiti, Republic of Santo Domingo, Port Cabaret: 1258, North Pacific Ocean, Islands of the Caroline Group; 1266, Eastern Archipelago, Java and China Seas, Gaspar Strait: 1267, Islands, Coast of Chile, Juan Fernandez Island, San Juan Bautista or Cumberland Bay: 1268, North America, West Coast of Lower California, Asuncion and San Roque Bays: 1270, Japan, West Coast of Kyushu, Nagasaki Harbor: 1271, Dutch Guiana, Surinam River: 1211, Guano Islands in the Pacific Ocean (chart of April, 1890, with Extensive Corrections, June, 1891): 1273, Chile, Blanco Encalada Road: 1274, North Pacific Ocean, Caroline Islands, Chabrol Harbor (Ualan Island): 1275, North Atlantic Ocean, Madeira Island, Porto Santo Bay: 1262, Tracks Followed by Full-Powered Steam Vessels: 1276, Brazil, Port Maceió: 1279, West Indies, Island of St. Vincent: 1272, North America, Dominion of Canada, Madame Island and Lennox Passage: 1281, Great Circle Sailing Chart of the South Atlantic Ocean: 1283, Great Circle Sailing Chart of the South Pacific Ocean: 1284, Great Circle Sailing Chart of the Indian Ocean: 1285, China, East Coast, Amoy: 1286, Jamaica, Port Antonio; 1287, Jamaica, St. Ann Bay: 1288, Jamaica, Falmouth Bay: 549a (chart of 1874, extensive corrections, 1891), Seto Uchi, or Inland Sea, Japan, Sheet 1: 1289, Jamaica, Annatto Bay: 307, Cuba, Harbor of Havana: 1277, Madeira, Funchal Bay: 1291, Japan, South Coast of Nippon, Gulf of Tokyo: 1293, Costa Rica, Port Limon; 1292, Nicaragua, Mosquito Reservation, Blewfields Lagoon: 1294, West Coast of Lower California, Abreojos Anchorage and Vicinity: 1296, Jamaica, Savanna La Mar Anchorage: 1297, Jamaica, Black River Anchorage: 1298, French Guiana, Salut Islands.

From the Interstate Commerce Commission, Washington:

Statistics of Railways in the United States, 1891.

From the U. S. Naval Observatory, Washington:

Report to June 30, 1890: Observations, 1885, 1886.

From the Navy Department, Washington:

Annual Register of the Naval Academy, 1890–91; The Nautical Almanac, 1894.

From the Post Office Department, Washington:

The Postmaster General's Report, 1890, 1891.

From the Smithsonian Institution, Washington:

Reports, 1888, 1889; Nat. Museum Report, 1888; Proceedings National Museum, vol. 13; Miscellaneous Collections, vol. 34, Nos. 1, 2, 3; Contributions to Knowledge, part of vol. 27; Six Species of North American Fresh-Water Fishes; Anatomy of Astrangia Danæ; Annual Report of the American Historical Association.

From the War Department, Washington:

Report of the Chief Signal Officer, 1890.

PART I.

TRANSACTIONS
OF
THE SOCIETY FOR THE YEAR
1891.

TRANSACTIONS OF THE SOCIETY FOR 1891.

Annual Meeting of the American Geographical Society, held at Association Hall, Tuesday, January 13, 1891, at 8 o'clock, P.M.

Vice-President CULLUM in the chair.

On motion it was voted to dispense with the reading of the minutes of the last meeting.

The following persons were elected Fellows of the Society :

Henry Rogers, Samuel M. Cohen, Hon. Henry Roger Wolcott, Sheffield Phelps, A. H. Teller, Joseph J. Henderson, Max Drey, J. Henry Cook, Capt. A. Shimmel, Chas. E. Rushmore.

The annual report of the Council was then presented and read :

NEW YORK, January 13, 1891.

To the American Geographical Society :

Since the last annual report there have been held seven meetings of the Society, and eight regular and six special meetings of the Council.

At the annual meeting, held on the 14th of January, 1890, President Daly delivered his address "On the History of Physical Geography."

At the meeting of February 10, Mr. Watson Griffin read a paper on "Canada : the Land of Waterways."

At the meeting of March 10, Prof. Henry W. Haynes delivered a lecture on "The Roman Wall in Britain."

At the meeting of April 14, Prof. Chas. Sprague Smith read a paper on "Modern Iceland."

At the meeting of October 27, Mr. P. B. Du Chaillu addressed the Society on the subject of "The Ancestral Home of the English Race."

At the meeting of November 10, Dr. H. Carrington Bolton described his observations during "Four Weeks in the Wilderness of Sinai."

At the meeting, held December 8, the Rev. H. C. Hovey delivered a lecture "On the Mammoth Cave, in Kentucky."

All the lectures were illustrated by maps and views.

It has been found necessary to increase the size and edition of the Bulletin.

The additions made to the Library and Map-Room number 2280, viz.: Books 493, Pamphlets, 1259, Maps and Charts, 502, and Atlases, 26.

The annual report of the Treasurer, Mr. Walter R. T. Jones, shows a balance to the credit of the General Fund, of $2,283.28.

The expedition, organized in the spring of 1890, under the leadership of Mr. C. Lumholtz, for geographical and ethnological researches in the mountains of Northern Mexico, left Arizona in August, since which time no report of its progress has been received; but intelligence may be looked for with the return of Prof. Libbey, who expected to remain with the expedition for about six months.

WILLIAM REMSEN, *Chairman of Council.*

The Nominating Committee then presented the following Report:

To the American Geographical Society:

The Committee, appointed December 8, 1890, to nominate suitable Candidates for the offices to be filled at the Annual Election in January, 1891, respectfully recommends the election of the following named gentlemen, viz.:

For President—Hon. Chas. P. Daly, LL.D., term to expire January, 1892.

For Vice-President—Gen. G. W. Cullum, U. S. Army, term to expire January, 1894.

For Treasurer—Walter R. T. Jones, term to expire January, 1892.

For Foreign Corresponding Secretary—Prof. Wm. Libbey, Jr., term to expire January, 1894.

For Councillors—W. H. H. Moore, Isaac Bernheimer, D. O. Mills, Rev. C. C. Tiffany, D.D., O. B. Potter, terms to expire January, 1894, and Henry Holt, term to expire January, 1893.

CLINTON ROOSEVELT, *Chairman,*
NATHANIEL P. BAILEY,
CHARLES A. PEABODY,
Nominating Committee.

On motion, properly seconded, Mr. Clinton Roosevelt was appointed to cast the vote of the Society for the nominees, and they were declared duly elected.

Vice-President Cullum then introduced to the Society Mr. Courtenay De Kalb, who delivered an address on "The Great Amazon: Personal Investigations on the River and in its Upper Valley."

On motion, the Society adjourned.

Meeting of February 9, held at Chickering Hall.

Vice-President STOUT in the chair.

The reading of the minutes of the previous meeting was omitted.

The following persons were elected Fellows of the Society:

De Veaux Powel, John Thomson, Lippmann Toplitz, Miss Harriet L. Robbins, Benjamin Thaw, George Arms, W. J. Nicolls, Chas. Neukirch, Amzi L. Barber, Dr. J. Adelphi Gottlieb, Stephen E. Babcock, Henry Belin, Jr., David M. Greene, Lewis S. Levy, Charles Wise, Benno Loewy, Kalman Haas, Frederick S. Pinkus, John H. Osborne, W. H. Adams, John Eyerman, W. B. Cogswell, W. E. C. Eustis, Gerard C. Tobey, Heyman Vogel, H. M. Boies, Gustav Bernheim, George M. Coates, Abraham Herrman, W. H. Jaques, John H. Hall, Fredk. R. Hazard, Charles H. Davids, Charles Howard Besley, Richard H. Gaines, Nathan Littauer, Julius Levine, Frederick A. Castle, M.D., Edwin Booth, Rev. T. M. Peters, William S. Briggs, Washington Jones, Charles M. Rolker, Charles E. Stevens, J. A. Price, Edward Emerson Waters, Grove P. Mitchell, Samuel Aufhauser, Eustace C. Fitz, E. D. Leavitt, John B. Atkinson, Fredk. S. Young, Mrs. Wm. Levin, E. D. Edgerton, Cornelius V. Sidell, Edward M. Peters, David C. Sanford, Ludwig Ulmann, W. H. Doane, Virgil G. Bogue, Hon. Milton B. Whitney, Charles Taber, Lawrence Barrett, John G. Agar.

The Chairman then introduced to the Society Mr. James E. Mills, who read a paper on "The Sierra Nevada (California)."

On motion, the Society adjourned.

Meeting of March 9, held at Chickering Hall.

Vice-President CULLUM in the chair.

The reading of the minutes of the previous meeting was omitted

The following persons were elected Fellows of the Society:

Harry S. Fleming, Enoch Lewis, Edward L. Young, Edgar B. Van Winkle, J. W. Ferguson, George H. Clapp, Robert B. Suckley, Chas. W. Galloupe, M. D., W. H. Calhoun, Jr., John Stanton, Henry Kirke Porter, Hon. Calvin S. Brice, H. G. Prout, Emanuel S. Ullmann.

The Chairman then introduced Prof. Chas. Sprague Smith, who addressed the Society on "The Orkneys and Shetland."

On motion, the Society adjourned.

Meeting of April 13, held at Chickering Hall.

President Daly in the chair.

On motion, duly seconded, the reading of the minutes of the previous meeting was omitted.

The following persons were elected Fellows of the Society:

John Cooper James Pott, J. Morgan Howe, M. D., John Brisben Walker, Alexander Harrison, R. E. Peary, U. S. N., Edward Gay, Thos. M. Dillingham, M. D., Edward W. Bell, Collin Armstrong, Rudolph H. Kissel, Edward Stieglitz, Abraham Lansing, Robert Jaffray, Jr.

President Daly then introduced Mr. R. E. Peary, U. S. N., who described his "Proposed Exploration of Northern Greenland."

On motion, the Society adjourned.

Meeting of October 27, held at Chickering Hall.

President Daly in the chair.

The President introduced Mr. Nathan Appleton, who delivered a lecture on "The City of Santo Domingo."

On motion, the Society adjourned.

Meeting of November 16, held at Chickering Hall.

President Daly in the chair.

The reading of the minutes of the last regular meeting was omitted.

The following persons were elected Fellows of the Society:

James B. Townsend, Louis A. Bendit, James A. Blanchard, Edward H. Burtis, Maj. D. J. Apgar, U. S. A., (retired), Edwin B.

Meeks, Robert W. Ferguson, George L. Raymond, Miss Georgiana White, A. V. Pancoast, Adolph D'Orville, Charles Potter and Thomas Letts.

The President then introduced Dr. Chas. Stuart Wells, who delivered a lecture on the "Holy Land."

On motion, the Society adjourned.

Meeting of December 14, held at Chickering Hall.

Vice-President VIELE in the Chair.

On motion, duly seconded, it was voted to dispense with the reading of the minutes of the previous meeting.

The following persons were elected Fellows of the Society:

Mrs. Angeline Ensign Newman, George H. Toop.

The Chairman read a letter from President DALY, announcing that he had selected from his library 609 volumes, 648 pamphlets, 17 atlases and 36 maps, and had presented these to the Library of the Society.

Mr. F. A. Stout offered Resolutions, embodying the sentiments of the Society on receiving the President's gift. It was ordered that an engrossed copy of these Resolutions be sent to President Daly.

Mr. Clinton Roosevelt offered a Resolution that a Committee of Three be appointed to nominate Candidates for the offices to be filled at the Annual Election in January, 1892. The Chair appointed the Committee, as follows:

Clinton Roosevelt, the Hon. Charles A. Peabody, and William Remsen.

Mr. R. H. Shannon moved that a Committee of Three be appointed to draft suitable Resolutions concerning the death of Pedro II., ex-Emperor of Brazil.

The Chairman then introduced to the Society the Rev. Albert P. Brigham, who read a paper on "Rivers, and the Evolution of Geographic Forms."

On motion, the Society adjourned.

PART II.

PAPERS READ

AND CONTRIBUTED TO

THE SOCIETY DURING 1891.

Note.—THE AUTHORS ARE RESPONSIBLE FOR THE CONTENTS OF THEIR RESPECTIVE PAPERS.

MANAOS.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXIII 1891 No. 1

THE GREAT AMAZON:

PERSONAL INVESTIGATIONS ON THE RIVER, AND IN ITS UPPER VALLEY.

BY

COURTENAY DE KALB.

Over three hundred and fifty years ago Lope de Aguirre, writing to Philip II. of Spain, concluded his report on a voyage down the Amazon by saying, " God knows how we got through that great mass of water. I advise thee, O great king, never to send Spanish fleets into that cursed river." A later monarch heard more pleasant news when, in 1639, Padre Cristoval de Acuña declared: " If the Amazons then is the chief street, the principal road by which to ascend to the greater riches of Peru, well may I affirm that she is the chief *master* of all those riches. If the Lake of Dorado contains the gold which common opinion attributes to it; if, as many affirm, the Amazons inhabit the richest country in the world; if the Tocantins are so famous for their gold and precious stones; if the Omaguas were so famous for their riches that a viceroy of Peru despatched a force under Pedro de Orsua in search of them; then all this wealth is now shut up in the great river Amazons. Here is the Lake of Dorado; here the nation of the Omaguas; and here, finally, is deposited the immense treasure which the Majesty of God keeps to enrich our great king and lord, Philip Fourth."

The fabled El Dorado retreated from the Amazon, shrunk from one unpenetrated wilderness to another, as explorers unlocked their secrets, until at last it vanished from the earth; but subsequent generations have not found cause to reiterate the pessimistic utterances of Aguirre. Still, in all parts of the world, the name of the Amazon calls forth eulogistic apostrophes, and men are so lost in admiration of its *greatness* that they fail to comprehend its utility. The Mississippi is not talked about and marvelled at so much by half in the present decade as it was forty years ago. Sceptics then doubted whether the railroads would ever be more than an expensive toy, and the great river of the West was looked upon as the natural channel of trade, but it is precisely in these days, when the *railroads* have developed the mighty resources of the Mississippi Valley, and the river that drains it has *ceased* to be the epos of patriotic poets, that the Mississippi is accomplishing its highest good as a regulator of freights, serving to hold in check the greed of corporations which have created arteries of commerce more wonderful than those provided free by nature. In like manner the world to-day loses power of adequate expression upon contemplating the 15,000 miles of steamship navigation, and the 50,000 miles of steamboat navigation afforded by the Amazon and its tributaries. It might almost be said that the Valley of the Amazon is cursed by the very greatness of its river. It has in fact *too much* navigable water ; a too intricately interlaced system of rivers and canals ; by which, on the one hand, men will continue too long to believe that nature has solved all her problems of transportation, and, on the other, when they do realize that this valley depends for its development upon railroads, these rivers and canals may prove in many cases a serious obstacle in the way of their construction.

The Amazon flows, during the major part of its course, through alluvial lands ; it is what we might call a " pratumial " river, like the Mississippi. Its tawny tide is subject, in large measure, to the same laws which govern the flow of the yellow floods of our great stream, except that the retation of the earth, instead of acting perpendicular to its general direction, serves to retard its swiftness, and perhaps aids to keep open the infinite canoe paths and *igarapés* for which the Amazon is so famous. Here are the huge bends, shifting, shifting, as the current eats away the banks, until the narrow neck of land is breached, and a cut-off suddenly disturbs the equilibrium of the waters, and the local geography is forever changed. The channel, naturally, is fickle, so that the pilot never knows his way with certainty. Here too are vast areas below the level of the river, which are overflowed during the rainy season,—basins in fact, presenting characteristics identical with those so familiar to us in the great Tensas Basin of Louisiana.

The Amazon is not a huge Erie Canal, with unvarying banks and depth of water, but will require the services of the engineer, just as the Mississippi has done, with the difference that there is three times as great a length of channel to be controlled; and those familiar with the expense of river engineering will not be astonished at the statement that railroads could be built to develop the resources of the entire length of the Valley of the Amazon at less cost than that of maintaining the channels and riparian harbors of this greatest of rivers.

Humboldt indulged in dreams of teeming cities and active trade throughout this mighty water-threaded land; even confused the world by painting the fascinating picture of open communication from the Caribbean Sea through the rivers Orinoco, Negro, Amazon, Tapajós, and Paraguay, to Buenos Aires. Lieutenant Herndon believed that with proper inducements to stimulate emigration, and above all with the immense impetus which would follow from the opening of the Amazon to the flags of all nations, Pará would in fifty years become the greatest city in the New World; that Santarem would become St. Louis; and Manáos, Cincinnati. That was forty years ago. The Brazilians, and many others, believed it. The nations of the earth were invited to the free use of the great waterway in 1867; parades, fireworks, balls, the dedication of monuments, attested the excess of Brazilian joy over the event. Foreigners were granted asylum and homes upon her soil. A quarter of a century has passed away, and Pará to-day numbers but 80,000 souls, and Manáos only 14,000! Three lines of ocean steamships ply to Manáos, a city blessed with a rock-bound harbor deep and spacious enough for a thousand ships to ride at anchor; monthly steamboats ascend 2,400 miles to Iquitos in Peru; others go 500 miles beyond to Yurimaguas, almost within the shadow of the Andes; others again journey to the foot of the cataracts on the Madeira, one of the greatest tributaries. The rivers Javary,* Purus, Içа, Juruá, Japurá, Tapajós, Xingú, Tocantins, are regularly visited by steamers—and yet the population of the Valley of the Amazon does not increase! Ay, more, towns that once were thriving are now falling into decay; the activity of the people is so far lessened that out of twenty articles produced for export in 1860, there are but six appearing on the bills of lading to-day, and of these all have decreased in quantity except Brazil nuts (castanhas) and rubber. The cocoa plantations are being overgrown with vines; cotton, rice, and sugar are no longer raised†; all have been abandoned for the gathering of rubber, and the wilderness is farther from being subdued than it was before.

A complication of causes has operated to produce this result. The Brazilian inherits from the Portuguese a genius for the initiation of great enterprises, and an inability to carry them to a fortunate consummation. He is apathetic, under the fatal spell of *dolce far niente.* The old Duke of Bragança, in 1580, suffered Philip II. to usurp Portugal, upon the promise of receiving Brazil as his portion. The promise was broken, and the Duke and the whole nation suffered it. That same submissive spirit lingers still. In 1889, two months after the Brazilians had been shouting *vivas* to the son-in-law of their Emperor, they cry other *vivas* to a republic which had not yet proven itself more than a military dictatorship. They are an acquiescent people; preferring to adapt themselves to circumstances rather than seize the helm and shape their own destinies. A recent poetical conceit unwittingly has characterized this land and those who hold dominion over it, with singular aptness in the following stanza:

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* In this name, and others ending in y, the accent falls on that letter.

† Considerable sugar cane is still produced, but it is used entirely for the manufacture of rum, or cachaça, for home consumption.

> "Nobody's in a hurry there;
> They are not permitted to worry there;
> 'Tis a wide, still place,
> And not a face
> Shows any symptom of flurry there."*

The demand for rubber opened up a new source of revenue. By going into the forests for a few months enough of the precious gum could be extracted to afford means for subsistence during the remainder of the year. It was easier than raising cotton, rice, and cocoa, so the plantations were neglected. The cocoa had at one time been the Brazilian's most promising crop, but even then he found it troublesome to cure it carefully, since attention to such little details was incompatible with long siestas in the mornings and afternoons, and he preferred the siestas in spite of the fact that his deteriorated cocoa sold for one-half the usual market price, obtained in other more thrifty parts of the world.

In addition to this is the network of political obstructions which chokes out all healthy development of the country. Few things are more fatal to national prosperity than to have government so administered that the individual is continually conscious of being governed. The merchant in Brazil comes in contact with an official in almost every transaction. He requires a license before he can engage in any kind of business. Foreign commerce and home industry are hindered by excessive tariffs. It is a tariff for revenue only, so the Brazilian levies in both directions, upon imports and exports alike. He needs a permit to visit his own steamer in the harbor. He has to pay the customs officer to tally his cargo to avoid disastrous demurrage. Under such conditions, as might be expected, political corruption reaches a degree almost unparalleled,—even in the city of New York.

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* Margaret Vandegrift, "Lazy Land," *Century Magazine*, Aug. 1890.

In Eastern Peru conditions are similar. The physical aspects of the country are nearly identical with those on the lower river. Similar customs prevail, and the officials are frequently even more arrogant and dictatorial, by reason of their remoteness from Lima, for where it takes four months for an exchange of correspondence the local official stands in little awe of the central government.

Trade is further stifled by the subtle poison of credit, whose baleful influence is felt throughout the length and breadth of the valley. It is a time-honored evil. Generations have grown up accustomed to it as we are to the mechanism of banking, with its relentless exaction of prompt redemption of commercial paper. The measure of wealth, then, becomes the amount of indebtedness, and the standards of commercial honor are reversed. In 1850, A. R. Wallace, the great naturalist, heard of an exceedingly *mean man* who lived at San Carlos on the Rio Negro. His reputation for depravity was so notorious that it had extended from town to town, a thousand miles away. When Wallace reached San Carlos he found that the moral obliquity of this contemptible personage consisted in refusing to give or accept credit in his commercial transactions. Aside from this he had never been known to give offence.

It cannot be disputed that the settlement of the Valley of the Amazon has been retarded in an extreme degree by the reputation which it enjoys for insalubrity of climate, and thus has largely been defeated that advancement which navigation was hoped to produce. The establishment of nearly every enterprise has been attended with the sacrifice of human lives. A conservative estimate places the death rate among the foreign residents in Pará at over 25 per cent., and among the natives it varies between 12 per cent. and 15 per cent. Only one twelfth of the children born arrive at maturity. The poor little creatures are literally starved and chilled to death. The Indian subsists almost entirely upon bananas, and the coarser variety called plantains. He raises a little yuca, which is not bad ; he makes, or buys, some hard farinha, which he eats raw ; and he serves up at all times a wretched stew of the unpalatable *pirarucú*, a dried salt fish, the great dependence of hungry Amazonians, equivalent there to potatoes in Ireland, or seals in Greenland. All eat it, and digest it, or try to. When first caught it is a handsome fish, three to four feet long, brownish gray in color, dorsal and anal fins very long, and set far back so as to almost join the tail, which is rounded, and blotched with a deep red color ; but after being dried it looks like sole leather. Such is the diet unchanged from year to year. They use vegetables as if they were worth their weight in gold, although I have seen fifteen different varieties growing finely in various parts of the valley. It is not uncommon to see six green, or string beans served as a relish with meat for a dozen persons, and yet beans grow here to perfection! Corn yields abundantly, and three crops can be raised on the same land in a year,—yet corn bread is an unknown luxury. The available foods are so many, so far in excess of those produced in temperate climes, that a northerner never ceases to marvel at the munificence of tropical nature, and still these wretched people try to subsist on plantains, farinha, and *pirarucú,—try*, but cannot do it. The craving of appetite leads to the eating of clay, upon which speedily follows dropsy and death. Sooner or later the system becomes anæmic for want of proper nourishment, and the patient falls a victim to bilious fever. It is marvellous that he has resisted disease so long. The hut is carefully embowered in a mass of trees; no ray of sunlight ever strikes upon it. Inside there is a chill like that of a vault; the earthen floor is so damp that the clay collects in balls under the heel, like moist snow, as you walk upon it. All the rubbish and garbage of the house is cast just outside the door, where it decays and exhales its poison. In open hammocks they sleep; sometimes even on the ground, with only a thin palm leaf mat beneath them. No effort is ever made to protect one's self from the rain, but men and women come and go bareheaded, drenched to the skin, as complacent in the midst of the furious torrent as if it were the clearest June day that ever shone. In North America even our poorest workmen know enough to put on a rubber coat, or to "go in" when it rains, but on the Amazon they do not, and in the very land of rubber the rubber coat is a luxury too costly to be dreamed of. Where customs such as these prevail can it bring us sadness to know that the Angel of Death casts her compassionate arms around the suffering children, or can we longer wonder that "fever" is a word oftener than any other on the tongues of those who dwell there? Indeed one is more disposed to wonder by what dispensation of grace *any* are able to defy so long the laws of health, and yet keep from the grave. In time, when thrifty men who fear not to labor, and thrifty housewives who believe in cleanly homes, have taken possession of this land, the fell name of "fever" will slip from the vocabulary, and be heard no oftener than in other lands.

I will not praise the climate; but I will call attention to the fact that in the Croton Valley of New York the prevalent malady is malaria and its malignant climax of bilious fever. Observe how these Croton farmers live. The house is nearly hidden from sight by trees; the earth is banked high around the foundation so as to prevent ventilation of the cellar, and keep the floors always damp; the windows and doors are all kept carefully closed, so as to retain a wholesome chill in the rooms; instead of planting a garden full of vegetables, instead of raising a flock of chickens and ducks, and making butter and cheese, and living, as they might, upon the fat of the land, they simply send milk to the New York market, with which to buy hams and pork, and so upon bread, and strong tea, and salt pork, they live, grow anæmic, wizen-faced, and suffer with malarial fevers—in one of the healthiest valleys in the world! It appears that effect follows cause in the United States as unerringly as in Brazil. Foreigners going to the

Amazon invariably find it troublesome to avoid the consequences of the negligence of their neighbors; they find moreover that they do not die immediately, and they speedily become reckless, and then quickly pay the fatal penalty. It is all needless, and whoever will avail himself of the experience of others in formulating a rational regimen of life in the tropics, may go there, and *live* there, with security.

Pará, it is, true, is afflicted with yellow fever, but it is worthy of note that previous to 1850 it was as famous for its unusual healthfulness as it now is notorious for pestilence. In those days the city depended upon surface drainage; disease is now fostered by the most defective sewerage system that the wickedness of incompetent engineering ever perpetrated.

It may now seem more comprehensible why the steamboats have not stirred the Amazon Valley into activity. There are characteristics which must be changed by a strong infusion of new blood before this country can be rehabilitated; and, moreover, it must be remembered that steamboats could not have accomplished it, even with a different people; that in no part of the world have they been known to do it; that they are but the pioneers of commerce, and cannot stimulate it to a broad and noble development. The towns on the Rio Paraguay are only a little better than when Dr. Francia was their autocrat; the Magdalena slumbers still amidst its palms; the Nile—we all know that the wise advisers of the Government counselled building a railroad to the Red Sea; and it was only after the Macedonian cry was answered by the moneyed princes of the Thames, and the iron horse brought her products to the sea, that India became a steady producer, and began to prove her power as a mighty constant factor in the commerce of the world.

The history of the exploration of the Amazon is not a joyous one. Vicente Yañez Pinzon, one of the lieutenants under Columbus, entered the mouth of the river in 1516, and according to his report the natives called it "Marañon," and to this day that part of the Amazon which courses through Peru retains the ancient title in common usage. In 1538 the Amazon was rediscovered by Pedro de Vergara, far among the Andes, where now stands the town of Jaen,* who furthermore "conquered" the valley. Two years later (1540) Francisco de Orellana, with his fellow traitors, "discovered and conquered" the Amazon, sailing from the Rio Napo, where Pizarro was deserted, out to the sea, and around to Trinidad. No fabled adventures of the Middle Ages surpassed the realities of this wild and desperate voyage, and no words can express the horrors through which the remnant of Pizarro's forces retreated back to Quito. Blood flowed freely where Orellana made his way, and the Indians' first acquaintance with the white man was mingled with terror. Next came Pedro de Orsua, with his company of intriguing monsters, with Lope de Aguirre in particular, who killed Orsua and eighteen or twenty of his party, at various times, on the long and dreadful route. Pará was founded by

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* In early times known as Igual Fongo and Pacamoras; corrupted later into Yagua-fongo and Bracamoras. Jaen was founded in 1549 by Diego Palomino. It belonged in the jurisdiction of Chaga Inga, of the province of Chuquimayo. Under the jurisdiction of this governor came also Santiago de las Montañas and Borja.

Caldeira* in 1615. At that time many Dutch and English ships were accustomed to visit the Amazon, and an English colony had been established on the Island of Tucuyús, which colony was promptly destroyed by the Portuguese.

A few soldiers having brought glowing reports of Eastern Peru, or Maynas, as they called it then, to the west coast, the province of "Maynas y el Marañon" was created, and Don Diego Baca de Vega was sent to the conquest of this country, "by the mercy of that conqueror" Don Francisco de Borja. It is curious to observe how inseparable are the words "discovery" and "conquest" in the old Spanish American histories. Accordingly a town was founded here just under the brow of the Andes, and called "San Francisco de Borja," in honor of the "merciful" conqueror.† But, as fortune would have it, Maynas did not at once enrich the royal treasury, and the land was left to the peaceful soldiers of the cross who came to the conquest of souls. The missionary labors in Maynas are of exceptional interest, but their history would form a tedious relation. Examples of noble self-sacrifice, and undaunted zeal in the midst of privations and dangers of a severity scarcely to be conceived in these days, have consecrated many a spot in that land with hallowed memories. The Portuguese, controlling the mouth of the great stream, aspired to possess it as far west as the Andes. Two new settlements of Irish[*] and English on the Island of Tucuyús were obliterated. In 1691 an expedition was sent up the river, ostensibly as a guard of honor with Padre Fritz, whose name has become so indissolubly connected with the great tribe of the Omaguas in Peru, but their efforts to usurp the country were frustrated by the Indians. Subsequent attempts were made, resulting only in further bloodshed, until at length all claims to East Peru were relinquished, and the Rio Javary was decided upon as the western limit of Brazil.

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* Pedro Texeira was with him.

† Borja was founded in 1634. It is probable that the early missionaries, who were the actual settlers under authority from Don Diego Baca de Vega, complimented the viceroy, and sought for their little town the protection of the Saint of the same name by the title given.

The Amazon was but slowly emancipated from the obscurities which fable imposed upon it. Padre de Acuña first chronicled some half definite geographical knowledge, gathered during his journey with Pedro Texeira from Quito to Pará in 1639.[†] Even at that early date it was known that it was possible to ascend into the high plateaus of Bolivia, and thence to reach the famous mines of Potosí, by the way of the Rio Madeira.[‡] Acuña also tells us that one can pass from the Rio Negro into the Orinoco by a canal, and "descend to the North Sea, where are the Hollanders,"—Guiana.

At last the energy of a French scientist, La Condamine, gave the world some accurate information of this unknown region. This daring genius, having completed his astronomical labors, the measurement of a meridian at the equator, for which the French government had sent him, with others, to Quito, determined to explore the Amazon. He crossed to Jaen, and then descended the river, shooting the great rapids of Manseriche, and, continuing to Pará, made invaluable observations, dispelling mists of ignorance, ascertaining the latitude and longitude of important towns and mouths of rivers, and bringing data for a map, more accurate, I am constrained to say, than many school geographies of to-day.

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[*] The Irish colony under James Purcell was destroyed by Pedro Texeira in 1629, and the English colony in 1630, by Jacome de Noronha.

[†] "A New Discovery of the Great River of the Amazons," by Padre de Cristoval de Acuña; trans. by Clements R. Markham, F. R. G. S.; published in the Proceedings of the Hakluyt Soc. Also an early English translation published in London by S. Buckley, in 1698, contains an interesting map of the Amazon.

[‡] The Indian name for the Rio Madeira was Cayary.

At the close of the eighteenth century came the mighty Humboldt, exploring the Andes and the upper Amazon, the Orinoco and the upper waters of the Negro, with their binding canal, the far famed Cassiquiare. Knowledge is fast dissipating the darkness now, and the dawn comes on with greater rapidity. Von Martius and Von Spix explored the Amazon, Negro, and Japurá, in 1819, spending three years in botanical studies, laying the foundation for that monumental work on the Flora of Brazil, the last volume of which has scarcely grown cold from the press. Within the same decade Alcide D'Orbigny began his marvellous investigations, letting in new rays of light. Professor Pöppig followed close upon his heels, and then the English sent Smyth and Lowe to ascertain "the practicability of a navigable communication with the Atlantic by the rivers Pachitea Ucayli, and Amazon." The Prince Adelbert of Prussia, thirsting for adventure, explored for the first time the Rio Xingú in 1843. That indomitable traveller and accomplished scientist, Francis de Castelnau, in the same year began, by order of the French government, his mammoth journey from Rio de Janeiro across the continent and back again by way of the Ucayali and the Amazon to Pará, arriving in 1847, after four years of wanderings. At last the State Department of the United States, believing that "the geographical situation and the commercial position of the Amazon indicate the future importance to this country of the free navigation of that river," sent Lieuts. Wm. A. Herndon and Lardner Gibbon.* Herndon, with immense practical wisdom and clear judgment, executed his commission and submitted a report which stands to-day as the acknowledged classic on the resources of the Amazon. No book of travel has ever been written more free from errors or misconceptions than this of our distinguished countryman.

How well we have improved our opportunities may appear from the circumstance that when I arrived in Iquitos, Peru, I found the American $5.00 gold piece worth 7 *soles*, while the English pound sterling was worth 9 *soles!*—the *sol* having an exchangeable value there of about 80 cents.—The reason for this is obvious; the Peruvian has commercial relations in which he can use the pound sterling, whereas he has *no* use for the American coin. We have never realized that this question of trade with South America is a personal matter, an issue between man and man! The English and Germans working on that principle have obtained the commerce which we might have had. All the laws that Congress may enact will not give us this trade until we study the South American and his wants, and cater to his tastes. I was asked recently if there were any psychological explanation of this peculiar case of stupidity in the American, who in so many ways leads the world. I think there is. We are the greatest nation of inventors on the face of the earth. We are used to an educational policy in business. Each man has some patented novelty, which is "the best and only proper thing." He labels it *Eureka*, and sets out to benefit humanity with it. No matter what *you* may think,—it is his mission to convict you of error, and sell you "your money's worth." This is one of our national characteristics, but it is not advantageous to the creation of foreign commerce among conservative people. We must learn to send what *they* actually want, not what we think they *ought* to want, and let them bear the consequences. After we have established the trade will be time enough to encourage the adoption of our improved appliances.

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* Lieutenant Gibbon was detailed to explore the Bolivian tributaries of the Madeira, as well as the latter river, a labor performed with great fidelity, as subsequent explorations have proven.

There have been other explorers; Wallace, the naturalist, unlocking the last secrets of the Rio Negro; Vallée, telling us the final truth about the Araguaya and Tocantins; Agassiz, giving the history of the rocks and the fishes of the great valley; Keller explaining the difficulties of the cataracts of the Rio Madeira; Orton, elucidating the routes across the lofty Andes; and finally Crevaux, the Stanley of South America, climbing the unknown Tumac Humac Mountains, and penetrating the great wilderness of North Brazil, where fable until recent days had placed the Lake Parima, and the white Indians who dwell in the glorious El Dorado.

It is at last possible to know the Amazon, but unfortunately it is a *terra incognita* to the bulk of our people. It is conceived of as a dismal, interminable swamp; a vast, miasmatic basin, teeming with every species of obnoxious insect, with a boa constrictor on every bough waiting to seize you in the forests, with an alligator alert to devour you on every sand-bar, and a hideous vampire hovering over every sleeper in the night, and yet, after so many decades of assiduous exploration, scientists are in doubt about the vampire ; adventures with reptiles are as exceptional there as they are in many parts of the United States ; and alligators are as abundant and as voracious in the lagoons of Florida, as in Brazil.

Neither have I found it a reeking, pestilential morass. It is a valley full of strange delights, which even come down to the sea to greet one at the very threshold. The land rises into sight from the horizon of the ocean in a series of blue-gray bluffs, crowned with palms. At their bases are long lines of gleaming sandy beaches, with the surf curling in white wreaths over them. The soft air comes laden with the perfumes of flowers, and the invigorating scent of spices. When fully within the river, an odor, like that of ripe bananas, rises from the waters. Along the south shore are plantation houses, very pretty with their long, rambling, irregular, red tiled roofs, set off by white and yellow walls among surrounding groves of palms. The other shore of the mighty stream cannot be seen, but everywhere appear fairy-like islands, their outlines subdued in the tender rosy haze of tropical light, until they seem almost as ethereal as the air itself. Such were the first glimpses. Later in the day a black cloud rolled up from the sea, deluging the earth with a shower so heavy as to obscure even the shore near which we sailed. Then it swept on up the bay, and as we rounded a point of land the sun came out on a freshly washed forest, and Pará, now just visible, seemed lifted up into the air by the illusion of a mirage, where it hung like a city cut in cameo, with pearly towers and domes glistening against the background of a deep blue sky.

Pará is in many respects a handsome city, and with wise sanitary arrangements, and a stringent system of quarantine, it could not fail of becoming an attractive spot for tourists. It contains much architectural beauty, and the private houses with their luxuriant gardens are especially charming. The glazed tile, in delicate tints of blue and pink, is commonly used as a facing for the walls of buildings of every sort. The principal streets are well paved and the frequent rains keep them perfectly clean. It has its slums, however, which are as

RIVER FRONT, PARÁ.

shocking for their filth, as the other quarters are surprising for their beauty and neatness. The first hackman whom I patronized was instructed to convey me to Nazareth Street. The distance was a little more than a mile, and my driver took me through all the back streets he could think of,—a cosmic peculiarity of the race, and doubtless practiced by the hackmen in the cities of Mars. I thus had an opportunity of peering into a great many very dirty hall-ways, and of seeing an equally dirty and very briefly clad population. After getting my lungs well filled with the foul vapors exhaling from the green festering filth of these miserable streets, we came, to my infinite relief, into the broad plaza where stands the grand theatre, a splendid, massive, but Frenchy building. Here, at least, one could breathe. On the east side were tile-faced houses, with gardens of richly colored plants casting a flush of warmth over the cold white walls. On the other sides of the square were shops and buildings of a nondescript character. Beyond was Nazareth opening its splendid avenue of mangoes, graceful clusters of palms rising here and there, overtopped by an occasional dome of the giant *sama-uma.* There is a richness, a depth of greenness, and a beauty in outline, in the clustered masses of tropical foliage, which becomes more clear and striking when associated with works of architecture. Sometimes nothing more than a plain yellow wall with a window, or a balcony, becomes the interpreter of the beauty of a palm tree, and suggests all the romance of this land of flowers, and fruit, and happy idleness. Passing from street to street vistas of marvellous beauty continually open,—moss-grown yellow walls, and fantastic gateways; white columned houses amidst the dark green trees; lovely gardens with fountains playing, with statues bending gracefully among the flowers; with a rambling villa of exquisite design, massive and yet ethereal from the atmospheric tint of blue given by its glazed tile walls. The people are as picturesque as the city they live in. The Brazilian gentleman is always immaculate in his dress, and fond of colors. The negro population, which is very large, is still more addicted to display, and the brilliant hues of crimson, blue, and orange, gleam everywhere upon the streets. The tropical bird is truly of gorgeous plumage!

Pará occupies a position of great importance, being the port of the Amazon, controlling to-day the entire trade of the valley behind her. She is visited regularly by steamships of four different lines, one flying the Stars and Stripes, and by various tramp ships, and sailing vessels. Her exportations exceed $20,000,000 *per annum*, and yet the city is not being adequately enriched. Her own people have been too deeply imbued with the aristocratic heresy of the indignity of labor to seize the magnificent opportunities which lay within their grasp. They preferred the professions, above all the profession of politics, and in consequence the great rubber trade of the Amazon is conducted by a few foreign houses. Brazil is outgrowing this. Her children feel less aversion to honest toil than formerly, but her complete emancipation will probably come through amalgamations with foreigners, when, instead of being the conservative race she has been in the past, she shall acquire the broader character of a composite people.

The result of the growth of the rubber trade has been the extension of a vast steamboat system, reaching from Pará almost to the utmost limits of navigation in the Valley of the Amazon. Few indeed are the rivers on which the steam whistle has not been heard. One company alone has a fleet of over thirty boats, and there are several smaller lines. In addition to these are hundreds of private launches of from 10 to 100 tons burden, which visit the smaller tributaries in quest of rubber, so that there is scarcely a hamlet from the Atlantic to the Andes, which has not communication with the outer world by steamers of some description.

The lower Amazon has been so frequently described that further details may be a labor of supererogation. Suffice it to say that Pará is not on the Amazon ; that it stands at the mouth of the Rio Capim, on an arm of the Rio Tocantins, a great disadvantage to it as a port, a circumstance pointed out as early as 1639, by Padre de Acuña ; that you must first sail eastward to the sea of Marajó, and then westward 70 miles in the big estuary, and then northward through little narrow *furos* another 70 miles or more, before finally reaching the Amazon. This is a very beautiful sail. The estuary is like an enormous lake ; on its shores are sleepy towns nestled within the forest ; then come the picturesque *furos*, canals only 50 yards in width, where you can peer into sylvan secrets, where the giant trees almost overarch the steamer. In the Amazon you sail through a bewildering archipelago. There is the island of Tucuyús, where the English and Irish fell before the Portuguese; next comes the town of Gurupá, with its crumbling fort and other signs of former prosperity ; beyond which is the level delta of the Rio Xingú. The entire country is level in fact, without landscape; only a vast waterscape, with a fringe of forest, expanding, contracting, dotted with boats whose blue and red sails send long reflections of brilliant color trailing across these mighty reaches of river. On the north side is soon seen the mouth of the Rio Parú, recently explored by Crevaux. Here begins a low range of mountains, with level summits, breaking down into gaps of singular regularity of angle. The south shore still continues low and level. Farther on is Prainha, a town of diminishing importance; Montalegre next, clinging to the sides of high, steep hills. Mountains appear on the south side now, and the Amazon becomes very sensibly contracted. The Atlantic lowlands have been left behind, and at Santarem it is seen that we have passed the dividing range of mountains, and have entered the interior basin of the Amazon. Santarem,* a progressive town, stands on a high bluff overlooking the crystal waters of the Rio Tapajós, while behind it are ridges of mountains extending far into the southwest. This is only 400 miles from the ocean. Fifty miles farther is Obidós, the head of tide water, and the centre of a large cattle trade. Here are extensive grassy plains. The natives say that these extend far to the northward through that almost unknown belt of Brazilian Guyana. Certain it is this whole region north of the Amazon, as far west as the Rio Negro, is high land, and very different in character from the lower region on the south. The Rio Madeira comes in through a flat, swampy, unstable delta; the Negro is bifurcated at its mouth by a large island, but its northward shore consists of high sandstone bluffs. It is within the mouth of this river, where it expands into a deep bay six miles in width, and upon these sandstone hills, that stands the city of Manáos.

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* There is a small colony of Americans, from the Southern States, settled at Santarem.

The ocean is 1,000 miles away, but here within this inland harbor are steamships at anchor. Vessels of 28 feet draught can reach this point at all seasons of the year. It is the natural port for the products of the Rios Madeira and Negro, and of all the region west of them as far as the Andes. Establish telegraphic communication to this point with the outer world, and three-fourths of the present trade of Pará will be at once transferred to Manáos; give it a railroad to the coast of the Caribbean Sea, and it will become a second Buenos Aires. There is room upon these hills for a city of 2,000,000 inhabitants; it possesses natural drainage which will make its sewerage questions easy of solution; it already possesses a system of water-works having at command a large supply of pure water from the hills. There is a spirit which favors enterprise discoverable upon first contact with the citizens of Manáos. They believe in modern improvements; the water-works attest it; the gas installation now in progress; the big iron Yankee market building; the Yankee steel bridge; all demonstrate the public sentiment. They say the construction of these public works formed the basis of considerable political jobbery, which may perhaps be another sign of progress, on a par with the manipulations attending public works in some other corners of the globe! Furthermore, the Manaenses have subsidized steamship lines to bring them to their port; it has been hinted that they will encourage the telegraph company that will give them the daily market reports from New York and London; that they will remove the municipal and provincial taxes on whatever may be needful to start a lumbering industry in the adjacent forests; that they will aid a cotton milling company that will utilize the water-fall now wasting its power in the suburbs of the city. These fourteen thousand Manaenses are keen for their commercial betterment, realizing that they must exert themselves to overcome the advantages of their rival, Pará. The city is embellished with two handsome churches, a big college and museum, and other prominent public buildings.

From the Rio Negro to Peru the Amazon is called the Solimões. The whole river changes character. The forests are stunted; the foliage has a paler hue; the Imba-uba, or cecropia, a fig-like tree, becomes more abundant along the river bank, its ashen trunks strongly suggesting the cotton woods of the Mississippi. In fact this part of the Amazon strongly resembles the Mississippi. Its waters have the same yellow color; its shores are now high, and again sunken for great distances almost to the water's edge; back of these are extensive basins, the home of the rubber tree. They are not marshes, but are heavily timbered basins, subject to inundation during the rainy season. Important basins of this kind are, the region of the Maués Indians, between the Rios Madeira and Tapajós; that of the Manao Indians between the Rio Negro as far north as Barcelloso, and the Solimões and Japurá on the south and west; another between the Rios Purús, Coary, and Solimões; one opposite Fonteboa between the Japurá and Solimões; one opposite São

Paulo d'Olivença between the Solimões and the Içá; and the whole region around the mouth of the Rio Javary. The interior also contains many of these basins. They are characterized by a network of channels which unite many of the great rivers one with another. They furthermore contain extensive lagoons, and occasional areas of open swamp, while many lesser basins are only penetrated by such a backwater as is called a *bayou* in Louisiana, and which in Brazil is distinguished as an *igarapé*. The titles for the various watercourses in the valley of the Amazon are very accurately distinctive. The *igarapé* is always a *bayou;* where a channel leaves a river and returns to it again it is called a *paraná;* when it unites one river with another it is a *furo*, or *canal;* while a *rio* is always a river except in a few cases where some estuaries and long *furos*, or *paranás*, have been mistaken for independent streams. In the midst of these basins are many islands of higher ground, and it is upon these, when they front the rivers, that the towns are usually situated. Cudajós, the first important village west of the Negro, is built upon a clay ridge on the edge of the enormous Manao basin. Coary, Caiçará, Fonteboa, Tabatinga, and others are similarly placed. It is curious to observe that nearly the whole of the great interior basin, which contains these smaller basins, lies south of the Amazon. The river hugs the northern limit of this depressed area. It swings northward in Peru until the bluffs at Pebas deflect it southward; at Loreto it is again turned downwards to 4°, 30′ S.; it steadily travels toward the equator until it reaches 2°, 30′ S., when it is once more bent back to 4°, 10′ S., at Coary; it still determinedly resumes its northward journey, encountering the northern highlands, if so I may call them, at the Rio Negro, and following them closely until it finally gets clear of all hindrances at the mouth of the Rio Jary, from which point it pursues a due north-east course to that mouth called the Canal do Norte, in latitude one degree north. This characteristic of the river surely cannot be accidental. The Rio Negro shares the same peculiarity, keeping close to its high north-eastern bank instead of cutting a way through the soft alluvium of the Manao basin. It is furthermore worthy of note that wherever the trend of the Amazon is toward the north the tributaries from the south side empty into it through a considerable delta, while those from the north side do not. When the trend of the great stream is toward the south these conditions are reversed. If the engineer ever seriously studies the regimen of the Amazon with reference to the needs of navigation, he may have to ascertain here the rationale of one phenomenon at least which the investigations on the Mississippi have not taught him to comprehend. There are difficulties of navigation which distress the pilot in the Solimões. The channel is clear enough as far as Coary. This town, however, is difficult of access, being built within the mouth of the Rio Coary. Many towns along the Amazon are thus secluded, a measure of precaution, as some assert, against the obnoxious visits of former tyrannical rulers, but it is quite as likely that the greater abundance of the smaller fishes, and the greater security of the banks of the tributaries, had something to do with it. Another peculiarity of Coary is its very noticeable division into two parts as distinct as two separate villages. One worthy gentleman gravely affirmed that this was the product of political hostility, one part being republican Coary, and the other conservative Coary. I could not tell whether his eye twinkled or not as he said it, but other cities might take a hint from it.

Above Coary the pilot's apprentice soon begins to throw the lead, for the channel is so fickle that it cannot be trusted from one voyage to another. Sharp bends become noticeable, and the quantity of floating wood increases. The boat's propeller is constantly striking them, and there is a continual danger of running upon a snag. Just below and above the mouth of the Rio Juruá the river is a series of tortuous twistings, where navigation tries the skill of the pilot severely. There are no permanent marks along the shore; there is not a buoy, nor a beacon light, throughout the length of the Amazon, not even below Pará, and yet Indians and half-breeds steer these steamers, by night as well as by day, in rain and in fog, the same man guiding the boat 2,400 miles from Pará to Iquitos, and a serious accident is unusual. It is one of the marvels of the Amazon, and even the natives grow eloquent in their praise of the Indian for his skill in this. West of the Rio Jutahy there are no important difficulties in navigation as far as Iquitos, and even beyond this as far as Nauta.

As the days drag on the monotony of the river becomes more oppressive. There is nothing but endless forest, and channels twisting in and out among innumerable islands. There is a sort of painful fascination about it. Out of the fantastic vine-draped woodlands one can build in imagination grottoes, castles, and grotesque monsters, and, after hours of watching, as you come to the end of an island you feel as if a change must be impending, as if beyond this point of land, where the trees are growing scattered, and a broader expanse of water glistens through rifted ranks of foliage, beyond all this you feel that bays must widen, that cities must lift before your sight, and the journey there be finished. At times the banks rise high, exposing beds of yellowish-white indurated clay, exactly the color of a plastered wall. These precipitous banks, here and there broken down, and everywhere partially overgrown with vines, looked very picturesque, like some ancient walled town falling into ruins. Irregular hills of a hundred feet in height are also seen. Fonteboa, the most desolate town I ever beheld, is on high ground. Some fine old pale yellow adobe buildings are falling into decay here, and the few hundred inhabitants live in a long L-shaped row of small tile-roofed houses, packed as closely together as in New York streets, although there are millions of acres for them to expand into. São Paulo d'Olivença is prettily situated on an extensive elevated ridge. Small settlements and plantations appear at intervals, only serving to impress one more strongly with the amount of misery which men will inflict upon themselves by their want of thrift and industry. In happy contrast to this wretchedness was the sight of two contiguous plantations, called Santa Rita, the home of an old German and his son-in-law. Many acres have been cleared and, instead of being half choked by weeds and brush, the fields are as clean and lovely as any northern farm. The houses are kept neatly whitewashed, the blinds gleamed with a recent coat of green paint, and the porch looked dry and comfortable. Ample gardens, flocks of poultry, herds of cattle and sheep, fields of corn, all suggested material comforts. What better argument is needed than the sight of these sweet cheerful homes to prove that persistent energy, here as elsewhere, will yield its reward. These men are doing well, with circumstances no different from those which produce poverty and squalor among their neighbors. Here are infinite thousands of acres to be had merely for the tilling. Nature has supplied all, and only needs to be trained by the hand of man to serve and feed him. Furthermore, nature seems to have set apart this region, this interior basin of the Amazon, as the world's great conservatory of rubber.* It grows wild, in the lowlands subject to annual overflow. The tree is dome-shaped, about fifty feet high, with grayish trunk and branches, and sparse foliage. The milk obtained from the inner bark is collected in little cups, much after the manner of taking maple sap. The milk is then poured over round sticks, or flat blades, and cured by being held in the smoke of certain burning palm nuts, as the nuts of the Inajá, and Urucury. Layer after layer of milk being added, the product is finally prepared for shipment in the form of large round or flat-sided balls. Four-fifths of the exports of the Amazon consist of rubber, which is to-day, and will continue for many decades to be the most important source of wealth to the valley, and if the demand for this wonderful gum increases in the future as phenomenally as it has done in the past, the planting of great rubber orchards will become imperative. Dependence upon the wild resources is altogether too fortuitous; the available crop must become a more manageable factor, and in this necessity imposed upon Brazil is found one of the most hopeful indications that, in spite of the fluctuations of stock markets, and the errors of some rash investors, no amount of resultant prejudice against South American ventures can prevent the development of this Valley of the Amazon!

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* The *Hevea Braziliensis*, and *H. discolor;* natural order Euphorbiaceæ.

In earlier days Tabatinga, the frontier town between Brazil and Peru, was thought to be destined to great future importance, as the old law compelled a transfer of cargo from the vessels of one nation to those of the other at this point. But when the great river was constituted an international highway, the exigencies of commerce quickly changed all this, and the massive buildings which had been erected at Tabatinga are already in ruins. Only a little army post, and a custom house, remain of its former glory. The Rio Javary, however, which embouches just below the town, has lately risen in importance since the discovery of large rubber forests along its margin. Ten years ago this river was little more than known by name; now there are more than half a dozen towns along its banks, the steam whistle has startled the wilderness four hundred miles from its mouth, and its magnificent tributary, the Itacoahy* was last year ascended in a steam launch a distance of five hundred miles. The Javary is the boundary line between Brazil and Peru, and enjoys with the Amazon the advantage of being free to the flags of the world. The great steamboats that ply between Pará and Iquitos, always turn aside to serve the towns along this river, but as the commerce here increases it will unquestionably stimulate the establishment of a local line of steamers bringing the products of the Javary to Tabatinga for reshipment to Pará, which will resuscitate the fallen importance of this ancient town.

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*Wrongly called Techuahy on the maps. This exploration was made by Mr. James Baird, of Manáos, who ascended the Itacoahy, and its great tributary, the Ituhy, in 1889.

From Tabatinga to Iquitos is four hundred miles through the same low-lying forests, a mere repetition of the familiar scenery of the lower Amazon. On the way the mouths of a few rivers are passed, chief among which is the Rio Napo, the ancient route across the Andes, down which came Orellana, the first explorer of the valley. There are a few towns also, more notable in the history of Eastern Peru than for present consequence. Iquitos is a new city, the metropolis of the region. It has grown as a commercial necessity, owing to its geographical situation, being the most central point accessible by steamers of eight feet draught, for the trade of all the East Peruvian rivers. Its population numbers about 6,000, of whom 90 per cent. are half-breeds and Indians. There is a well-built Governor's Palace, containing the custom house and all the government offices. A considerable machine shop is also maintained under government patronage, but the 1,000-ton floating dock mentioned in the encyclopædias was long ago sunk by incompetent management, and the hospital was never finished. There is a municipal school, a church, and several quite pretentious private buildings, one of which is said to have cost $100,000. The city owes its importance to the rubber trade, and contrary to the usual custom in Spanish American towns all æsthetical considerations have been overridden by the commercial zeal of the trader, so that the place possesses little beauty. The streets are bare of trees, and very few are cultivated in the private gardens. Even the plaza which was contemplated by the earlier settlers has been sold for business purposes by the municipal authorities. The value of property here is a good index to the commercial activity of the city, lots of 300x500 feet being worth from $100 to $2,000 according to their location with reference to the water front. Judging from statistics Iquitos is at present less prosperous than she was five years ago, but the decline can hardly be permanent. The mammoth *caucho*, or Castilloa trees, which yield the bulk of the Peruvian rubber, have been destroyed in great numbers by the ruthless gatherers of the gum, reducing the exports in proportion, but rubber orchards will ere long be planted, restoring the trade of this region to even greater prosperity. Furthermore, this country cannot long fail to attract the emigrating hordes of Europe. Look along the river here! Two thousand miles of it in Peru alone; one thousand of it navigable by boats of five feet draught! Three hundred and fifty miles of deep water on the Rio Ucayali; one hundred on the Rio Huallaga; one hundred and thirty on the Rio Tigre; with many others of lesser size. A steamer already makes monthly trips from Iquitos to Yurimaguas, at the head of navigation on the Rio Huallaga. The land is gently rolling, but the tide of this great stream flows through these hills, as placid as the Hudson beneath its Palisades. There is no swamp to be seen, but on every side is the luxurious vegetation of the tropics. The Andes are not far away, and their presence tempers the atmosphere. It is more bracing than the lower parts of the valley.

The Huallaga, as it rises, affords a climate to suit every constitution, from him who revels in the tropics, to him who loves the icy breath of the frigid zone. The settler may choose to be a grower of rubber, of rice, of sugar, in the lower land along the Amazon and Ucayali; he may choose to plant tobacco, rivalling Perique for its rich aroma, cinchona, cotton, coffee, corn, in the higher land along the Huallaga and its tributaries, where the climate is a perpetual spring, where summer heat was never known, nor frost has nipped a single bud. Here are pretty little towns already started,—Tarapota, and Moyobamba, in the very heart of this favored region, the latter a well-built city of 8,000 souls; and beyond them are rich plateaus where wheat and barley, apples and all the northern fruits and garden vegetables

TROPICAL VEGETATION.

will gladden the hearts of wanderers from boreal climes. Of special importance is the cinchona tree, which is indigenous to these inter-Andean valleys, and which could and should be cultivated there with profit*; but which in its wild state has been destroyed by the reckless gatherers to such an extent that the plantations established by the English in Ceylon, and Jamaica, and by the Dutch in Java, supplied in 1889 sixteen millions of the seventeen millions of pounds of cinchona bark from which the world in that year obtained its quinine.

There is yet another portion of Eastern Peru, of splendid possibilities, full of beauties, regarding which the world has had only dim, uncertain testimony. This is that part of the Amazon from the mouth of the Rio Huallaga to the Andes, a distance of 200 miles, locally known as the Alto Marañon. This it was my privilege to ascend in canoes one year ago. In its lower part the whole environment is the same as that seen throughout the length of the Amazon. It is wonderful to think that at this point, San Lorenzo, 2,800 miles from the mouth of the river, the elevation does not exceed 750 feet above the sea. The only difference observable is the greater magnificence which the forests possess as viewed from the canoe, which creeps close along the bank at the feet of these woodland giants. The smooth trunks stand like polished columns of marble in an architecture grander than man has yet produced. Now their color is gray; now white; again tinged with a flush of red; or turned into rarest *verd antique.* To a height often of more than a hundred and fifty feet they tower in their splendid strength, without the deviation of a single line from arrow-like straightness, their symmetry unbroken by a single branch, until at that great altitude the limbs, like mighty arms, stretch forth, supporting domes of densely clustered foliage which overspread the smaller trees beneath. It is a piece of nature's glorious architecture, sublime in its simplicity and elegance of proportion, possessing that mysterious charm which is always the part of greatness. Around the bases of these mighty trees is a mass of vine and shrub, with palms springing in graceful curves out of the surrounding foliage, drooping back again as if loath to leave the earth, their supple leaflets ever trembling in the breeze. Such arabesques, such curves, no Moor has traced in Granadan palace, nor artist Angelo has wrought into groin or nave of his masterful temple. The shadows of the woodland are relieved with bloom of every hue. The orchids imprisoned in their forest towers, like some Lady of Shalott, are tangled in a maze of thread, which has flown adrift to weave festoons and lace-work in this confusion of tropical exuberance. At times the Indians who paddle our canoes give us a little excitement when they hear game on the shore, the grunting of wild hogs, the snapping of twigs as a tapir crashes through the brush, and entreaties are useless. The huntsman's instinct is too strong, and off they go, mad for the chase. Again, they see a beautiful umbrella-shaped paw-paw tree with its handsome cluster of golden fruit, and to the shore they go again, and with their habitual lavishness fell the tree to get the treasure.

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* Since the above was written the price of cinchona bark has been decreasing, until it is stated that the East Indian plantations have ceased to be profitable, and many planters are even grubbing up their trees to make room for other crops. Under these circumstances it may be said that cinchona will never be grown to any extent in South America.

In the first hundred miles of the Alto Marañon are occasional plantations—*chacras*, they call them—and the two little towns of San Antonio and Barranca. The river, mind you, is still a thousand feet in width, and steam launches now and then come up here after rubber. The plantations produce delicious bananas, excellent corn, many vegetables, and handsome cattle and sheep, but they are usually poorly managed. The huts of savage Indians are becoming common. Hitherto the natives have been mostly of that dejected and unfortunate class known as "Christianized." The savage strikes you as being nobler, showing the influence of freedom. The Indians of the Valley of the Amazon are not prepossessing in appearance. The short stature, the short thick nose, the heavy jaws, and the small facial angle, do not indicate high intelligence. The Tupi tribes of Brazil, the Iquitos, Omaguas, and Tucales of Peru, are in general of great docility, and have yielded meekly to the domination of the whites. But at Barranca and westward, I met a tribe called Ahuarunas, which departs in many characteristics from those around them. The first whom I saw were the chieftain and his wife. He was tall and heavy, and had a pleasant face, with well-chiselled features, the forehead high, the nose long and perfectly straight. His hair, in addition to hanging down his back, had been made into two little braids which hung like horns from his temples. His only garment was a brown striped waist-cloth. In manner he was as simple and *naïve* as a child. His wife, who followed along behind, stopping when he stopped, advancing when he moved, like a faithful dog, was a mere girl, of slight form and delicate features, with a small chin, and an almost Grecian nose. Her arms and hands were of an absolutely perfect mould. Later in my journey I met others of the Ahuarunas, and these exceptional characteristics seemed to be a persistent quality of the tribe. I regretted that time would not permit me to remain longer among these Indians to learn something of their language, which I was told differed greatly from those of the neighboring tribes. The native dialects of the East Peruvian Indians are in general harsh and unpleasant, the words terminating with a sharp rising inflection, and the voice sustained even at the end of the sentence, giving it a peculiar unfinished sound. It is too late to study these dialects in their purity. Spanish words have become unconsciously incorporated into the Indian speech, sometimes a single word consisting of an Indian and a Spanish root combined.* Also the Spanish pronunciation has confused the tongue of the aborigine, distorting native names in the vain effort to represent their sounds through the phonetic value of the letters in the Spanish alphabet, as, for instance, in the common blue flowering herb which the Indians call "ocojoquay."† The English sound of "j" being absent from the Spanish language, the best the Spaniard can do is to call it "ocolloqui"!

From Barranca is obtained the first good view of the Andes, which are seen in an encircling arc of serrated mountain, curving from the South into the North. They are very beautiful; very deceptive, too. The blue peaks, when the cloud banks lift, stand out so clear against the sky, and tower to such a lofty height above the wide expanse of gently undulating forest, that they seem close at hand, although they are fifty miles away. The peaks of Chayavitas and Cahuapanas, which rise behind Moyobamba, are especially conspicuous, with their precipitous flanks and pointed summits. A hundred miles the river threads this forest before reaching the bases of these blue mountains, but we realize their nearness in many ways. The air smacks of their tonic ozone, which dispels the sultriness so common on the lower reaches of the river. Shrubs and grasses belonging unquestionably to higher altitudes are noticeable, and serve to indicate the agricultural possibilities of the region. There are no plantations between Barranca and the mountains,—nothing but a vast wilderness, waiting to be subdued by man! The river winds among its hundred islands, ready to be the burden-carrier of a busy race. But now all is silent, deserted. It is a *cul-de-sac*. At the head of this lovely valley is a gorge, the Pongo de Manseriche, the limit of possible navigation on the Amazon. My own soundings show that a vessel drawing five feet of water can ascend to this point, 3,000 miles from the sea, with perfect ease. The only points where a vessel of deeper draught would be obstructed are the shallows of Semira, 16 miles east of Parinari, where it is never safe to count on a greater depth than seven and a half feet, and at Vapor Playa, in the huge bend immediately below the junction of the Rio Pastassa with the Amazon, where for about ten miles the river is extremely wide, but not more than six and a half feet in depth at low water.

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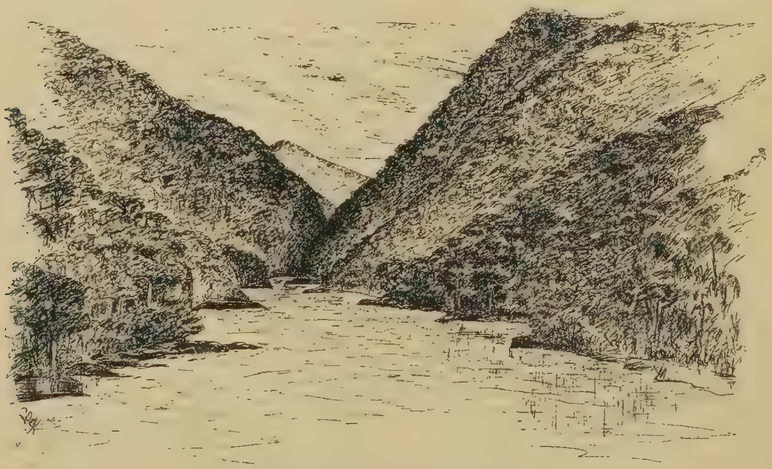
* As in Puca-cascajo, or red gravel.

† Called Rinção in Brazil; used as a febrifuge.

At the Pongo de Manseriche the old story of La Condamine's adventure in shooting these rapids 150 years ago returns to mind. His name has become a classic association with this spot, but his description, full of that awe of nature which ever filled his soul, has been built upon by historians until few know what is truth and what is fable. The "sombre light" of his account, words richly expressive of the softened glow filling the narrow defile, has been enlarged in Peruvian story to a twilight darkness. The gorge in its narrowest part does not exceed 200 feet in width. Into this channel is contracted the river which immediately below expands to 500 feet, and yet there is no sign of those foaming waters, no spouting spray, no furious rush and roar, which are the common quality of cataracts. The flood glides swiftly down at a pace that wins the greater admiration because of its comparative silence. Now and again the waters heave and send huge waves rolling concentrically away, and for a few seconds there is a tumult, but soon it subsides again, and the tide flows



PONGO DE MANSERICHE.

placidly on. This is very remarkable, considering the extreme crookedness of the passage. The ridges of the mountains jut out alternately from opposite sides, like a dove-tailed joint. At last comes the main ridge of the Cordillera. The walls face each other here, the crests rapidly declining toward the gorge, and dropping down finally in so sharp a descent that the effect is almost one of perpendicularity. But the angle is just sufficient to admit of a scanty growth of trees.* Here is the narrowest part of the Pongo ; here is the "sombre," soft, subdued, and hazy light, which has been wrought into deeper twilight obscurity in the lucubrations of historians. A soft light indeed ! At the points of the mountains the densely clustered foliage intensified the color to a fine dark blue. Back from the river, in the deep defiles between the ridges, the azure tints become more mellow, more dainty, with the diffused light of rays dispersed by millions of glossy leaves. Through the gorge could be seen still other ridges, sinking in the distance, and fading into the tender blue. There was a solemn majesty in the scene such that I was loath to leave. It was in keeping with the character of the Amazon. Even here among the mountains, it hollows out a passage so deep that its mighty current may sweep through almost unruffled.

The question has been agitated ever since the days of Humboldt of raising the Amazon at this point by a dam, or of building a canal around the rapids, in order to open up navigation to Jaen, nearly two hundred miles beyond. I do not know what reaches of navigable water may exist west of the Pongo, and the testimony of the Indians on such a question is of little value, for they will affirm that a steamer can ride wherever a canoe can pass. They tell of four other Pongos, or cataracts, between Manseriche and Jaen, which is of some importance to know, and I can say with perfect confidence that to construct a canal around the great Pongo is utterly chimerical. At the very least it would require the excavation of one cut 700 feet deep, and nearly a mile in length, and several smaller ones, aggregating several miles with an average depth of more than 300 feet. A dam would be equally impracticable, for the current at low water has a speed of not less than fifteen miles an hour, and the depth, estimated from the quantity of water flowing through, is over twenty feet.* The river furthermore, is subject to phenomenal variations in volume, rising or falling often as much as fifteen feet in a single night. The construction of a dam under such circumstances is not to be thought of. There is another problem, however, which must in time attract the attention of the world. If navigation must end at this point, the site, it will be remembered of ancient but now deserted Borja, the first, and for more than a hundred years the most important town in East Peru, then a railroad could be built, connecting on the central plateau of Ecuador with the line to Guayaquil, or pushed directly west to the Peruvian coast. The latter is the shortest route from navigable water in the Amazonian basin to the Pacific Ocean. Nature has cut the way through every range of the mighty Andes.

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*It is a peculiarity of the eastern Cordillera of the Andes, in this part of Peru at east, and as far south as Shapaja, that it is clothed with verdure to its summit.

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* Discharge just below the Pongo is approximately 4,000,000 cubic feet per minute, at medium low water.

Just beyond the Pongo the Rio Santiago flows down from the north into the Amazon. Its principal tributary, the Rio Paute, is soon encountered, which has carved a passage westward through the central Cordillera to the town of Cuenca, on the same plateau where Quito nestles among its guardian peaks; or, following the Amazon to the superb valley of Jaen, nature has again cut the way through Andean walls to the Peruvian port of Payta.* By such a line of railway these fertile valleys would be developed, and the products of this whole vast state of East Peru, or Loreto, would find the most direct and rapid route to New York City through the Nicaragua Canal, which the genius of America will soon have made an accomplished fact.

For a moment let us glance at this great valley with comprehensive vision. For three thousand miles, after bursting through the Andes, the Amazon wanders through a mighty forest, the largest in extent, the most varied in its flora, which exists upon the globe. Immediately beyond the mountains the great interior basin spreads out, growing wider and wider, until it reaches the Rio Madeira, where it is nearly 500 miles from north to south. This basin is traversed by other mighty tributaries of the Amazon, which are navigable to the edge of the Bolivian plateau on the south, and to the beginning of the higher ground in Ecuador, Colombia and Venezuela on the north. Then, just below the Madeira, at the Rio Tapajós, is the Errere range of hills, springing almost precipitously from the level plain, stretching southward to the southern confines of Brazil, dividing the interior basin from those broad Atlantic lowlands which an infinitude of rivers, *paranás*, and estuaries, has broken up into the most bewildering archipelago known upon the earth. This great valley has led many a mind into fanciful dreams. Even that intellectual Titan, Alexander von Humboldt, lost practical judgment in the poetical conception of utilizing the waterways of South America, but the very facts he gives in his own narrative are enough to dispel the illusion. Read his graphic description of the two enormous cataracts on the Orinoco. Then read Wallace's account of the miles of rapids on the Rio Negro. What avails it then that these two rivers, on the plateau where they take their rise, are connected by the Rio Cassiquiare? To build canals around all these rapids would be worse than reviving the defunct Panamá Canal. Likewise, on the south, we find many rapids on the rivers, which render the use of the intermediary portions impracticable, except for mere local transportation. Not many years ago the Madeira and Mamoré Railway Company started to build a road 240 miles in length around the long series of falls on the Rio Madeira, to connect with the great navigable rivers of Bolivia, but for various reasons the enterprise succumbed. It was a strange plan, and would have probably done very little toward developing the Bolivian plateau of the Mojos Indians. Rail communication without telegraphic connection with the market centres of the world cannot yield advantages which will enable the ordinary resources of a country to redeem its cost. The same lack of knowledge regarding the wants of mankind, which we find indexed in the market reports, is the fatal obstacle in the way of developing a country by means of navigation. The Valley of the Amazon is grander in size, it is in many ways more wonderful than the Valley of the Mississippi, but it is far less glorious! It is the way of God to give good gifts unto his children, but the consecration of them, by which their full sublimity becomes realized, is in the spirit with which His children receive and use them.

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* It is stated that the piercing of a single ridge in the Western Cordillera by a tunnel of no great length would render the construction of a railway line comparatively easy.

As I passed through this land of marvels I beheld town after town mute and sleepy on their palm bound shores as if an everlasting sabbath calm had settled over them. Held as by some enchantment, this equatorial race slumbers in the joy of an unending siesta. The richest valley of the earth is their inheritance, but they rise not up to possess it! But blame them not harshly. Centuries of conflict, centuries of isolation chosen in preference to a career of tumult in their national centres of civilization, have made these people content with the fortuitous happenings of the passing hour. The grip of grasping monarchies across the sea, until recent years, has further stifled budding enterprise. They have struggled against a thousand obstacles, while the millions of Europe have been filling the hospitable lands of temperate climes, ruled by descendants of those who demanded Magna Charta, and of those who proclaimed the Declaration of Independence. Now, however, they are awakening! The world is reaching out to them, and they are responding with such grace as men can when the facts and circumstances they confront are new. They are neighbors of ours; people of this New World. They pattern after us in their governments, and look to us to give them the hand of fellowship. The word of an American will be taken there as equivalent to his bond, and they welcome our people with whole-hearted fervor. It is a region open to us for commercial conquest, and American shrewdness, coupled with some modicum of that financial intrepidity which has characterized the English in their dealings with South America, will give us a new outlet for the product of our labor, and dominion of warm fellowship in the hearts of thousands who shall found happy homes in that land of plenty, when American locomotives fly from the Caribbean to the interior basin of the Amazon, from Eastern Peru to the Pacific Ocean, and from the plains of the Mojos to Rio de Janeiro, and when that greatest of American inventions, the electric telegraph, lets in the light of the world upon the darkness of that mighty valley, converting those who dwell there from the inhabitants of a benighted land into enlightened brothers to us all.

MAMMOTH CAVE, KENTUCKY.

A Lecture delivered before the American Geographical Society.

BY

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Modern voyages and travels have been pushed with such vigor as to reach nearly every nook and corner of our planet. Yet these researches have been mainly superficial in the sense that they have been limited to the surface of the globe. You are now invited to visit a region below the surface; a sunless realm that has, however, its mountains, plains and valleys, its lakes, rivers and cascades, its unique and extensive fauna and flora, and that claims a degree of attention not yet accorded to it by scientific men. While something has been done by individual enterprise, and in connection with state surveys, it yet remains for our geologists and geographers, by a system of thorough exploration, to take possession of under-ground America. It is estimated that the subterranean windings underlying the Ohio valley alone would, if put end to end, make a passage-way of 100,000 miles—a tunnel long enough to go four times around the globe. The region thus honey-combed in the single State of Kentucky exceeds 8,000 square miles. There are said to be 500 open caverns in Edmondson County, of which Mammoth Cave, now to be particularly described, is but a noble specimen.

The region shows few traces of dynamic disturbance, but its rocks have been carved in every conceivable manner by the chemical and mechanical action of water. Jutting crags at the head of ravines form what are known as "rock houses," or "rock castles," and that are highly picturesque, but seldom have any great depth. These ravines are usually dry in summer, though flooded in winter. The general absence of running streams has caused this portion of Kentucky to be called "The Barrens." The torrents formed in the rainy season cut their way through the strata down to the drainage level, and re-appear as perennial springs, often feeding rivers of considerable size. Green River is such a stream. It drains Mammoth Cave, as well as many other caves. Its waters never freeze, even in the coldest weather; and being navigable for a considerable part of its course, it furnishes a winter harbor for steamboats and other craft, when the Ohio River, into which it empties, is either ice-bound or clogged by drifting ice from the northern valleys.

One who strolls along the margin of Green River will observe at intervals arches, or it may be mere rude gashes, in the bluffs. Now and then these openings can be entered, though usually they cannot be explored very far. Could this be done we should find a succession of tiers, or galleries, by which we might make our way, from stage to stage, amid surprising and magnificent rooms, until at length, we should emerge into an oval valley, around which may lie a cultivated field, or more probably a tangled thicket. These are sink-holes, natural traps, into whose jaws, in modern times, hogs and cattle have disappeared; just as in ancient times elk, bear and bison were entombed. Sink-holes near habitations have usually been stopped up, thus being transformed into ponds. The enthusiastic cave-hunter enjoys being let down by a rope through a sink-hole, if practicable, and then wandering on lamp in hand, through wonderful apartments where no human foot ever trod before. But the more safe mode of entrance usually is at a point where the cavern roof has broken through, the fragments forming stepping stones.

Mammoth Cave is in latitude 37° 14′ N., and longitude 86° 12′ W. It is midway between Louisville and Nashville, and may be reached by railroad. The environs are wild and rocky, abounding in game. Hence the legend is credible that the great cave was discovered by a hunter, named Hutchins, who in 1809, followed a wounded bear into its grim fastnesses. The cars now land us near the Mammoth Cave hotel, which is itself an architectural curiosity. The original cabin, as built in 1812, still stands intact, except that its logs are weather-boarded, and its masonry is hidden by masses of ivy. The log cabins were increased in number, as visitors multiplied, and to meet their demands a main edifice has been built with offices, parlors, ballroom, etc., which has been nearly doubled in size during the past year; while the cabins themselves stand as at first, except that they are connected by a long and delightful veranda. On entering the office we meet with a hearty welcome from Manager Ganter, and register our names with thousands of others who have come hither from all parts of the known world. The majority however are from the Southern States, and he who wishes to see the best types of Southern society will be gratified here.

Loitering amid the long colonnade, by whose tall, white pillars the breeze floats in from a grove of aged oaks and across a blue-grass lawn, we find the very atmosphere redolent of romantic associations. How many thousands of tourists and savants have met here to gratify their curiosity concerning one of the wonders of the world. Guide-books can be had at the office, together with a map of the cave, both prepared by the author of this lecture for the convenience of visitors, and which, though far from perfect, give some idea of the intricacy of the subterranean windings. The areal diameter cannot exceed ten miles ; but the labyrinthine mazes are supposed by the best authorities to exceed 150 miles in all. The ordinary tourist seldom sees more than a comparatively small portion of this vast realm. Two principal routes have been marked out : the Short Route, covering about seven miles of underground travel, and requiring about four hours ; and the Long Route, taking nine hours and covering perhaps sixteen miles. Special trips are also arranged for those who wish to take them. My object in this lecture will be to conduct the audience over these regular trips, with perhaps an occasional digression. The regulation hours for entering the cave are 10 A. M. and 7 P. M. Moderate fees are charged, three dollars for the Long Route, two for the Short Route, and one each for the Special Routes.

Guides are autocrats here, and our safety depends on our obedience to their directions. Stephen and Matt, favorites with an entire generation of cave hunters, rest from their labors. Their places are filled by William, Nicholas, Eddie, and others, black, white and mixed, who stand ready to enlighten us by scraps of wisdom and flashes of wit original and selected.*

Accoutred as we please we saunter down the forest glen and across a rustic bridge, to a rocky platform some 300 yards from the hotel, and 194 feet above the level of Green River. A geological section shows that the Chester sandstone forms the crest of the bluff, under which are strata of Saint Louis limestone, that have been excavated to the depth of 328 feet, though the horizontal tunnelling has extended for a great many miles.

The mercury may have marked 100° in the shade when we began our walk; but at the cave's mouth it falls to 66°. Lift your hand and you will find the fervid heat again. The cold current may be felt for a long distance before it commingles with the ordinary atmosphere. But when, as is the case in winter, the exterior temperature is lower than the interior, the current is reversed. The cave seems thus to breathe in and out, as if the mighty lungs of the earth were inhaling and exhaling the vital air—a phenomenon that caused the

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* This lecture, as delivered, was profusely illustrated, and I regret that the pictures cannot be reproduced here. Mention, however, should be made of my artists. Mr. J. Barton Smith took the sketches used in my guide-book and magazine articles. The pioneer of subterranean photography was Mr. Charles Waldack, of Cincinnati. Since his day, Messrs. Thumb, Sesser, Farini, Darnall, and especially Ben Hains, have done work to be proud of when the intrinsic difficulties of their task are considered. I may add that my materials for the lecture itself were obtained during repeated trips through Kentucky, and have to some extent been already treated by me in descriptive narrations that may have fallen under the reader's eye. But in using them for the present occasion they have been carefully revised and corrected by recent observations, and important additions have also been made, now published for the first time. H.

Greeks to give the name of Antron to such openings, meaning a breathing-place.

Mammoth Cave has a noble vestibule! Amid tulip trees and grape-vines, maples and butternuts, fringing ferns and green mosses is the gateway which the fingers of a rippling rill made ages ago by prying the rocks apart. The rill still runs and leaps fifty feet to the rocks below. As we descend the seventy steps of solid stone, winding around the cascade, we find that the air grows cooler still, till it has fallen to 54° Fahr., which is the uniform temperature winter and summer, year after year. This fact I determined after taking one hundred and fifty temperature observations in different rooms, pits and avenues, with the best instruments to be had from the Kew and Winchester observatories. In determining the temperature of the vast apartments of such a cavern we have doubtless ascertained the mean temperature of the crust of the earth, at least for that latitude. This conclusion has been since confirmed by repeated observations in other caves and grottoes of the Western States.

Having traversed a roomy ante-chamber we pause at an iron gate put there to prevent spoliation, illegal surveys and the intrusion of non-paying visitors. The guide unlocks the gate, and we take our last look at the dim daylight that struggles in between the bars. As the breeze we had noticed at first dies away, we light our lamps, feeling that it would be a serious matter to be lost in so vast a domain of darkness.

Old Jack, the house-dog, used to think so, too, and would accompany visitors no further than the gate, where he would peer into the mysterious darkness, and then plod along home. But Jack had a companion in his old age, a frisky young puppy that knew no fear and never had a solemn thought. The latter would boldly follow us to the remotest bounds of the cavern. On one occasion he went with Professor Brewer and myself to the regions beyond the rivers, where he got lost. We set a lamp for him at Echo River and returned to the hotel. The next morning on going in we found him sitting by the lamp patiently waiting for us. But no sooner had we ferried him over than he ran away again. He was missing till the second morning, when on opening the cave the guides found the two dogs on opposite sides of the iron bars exchanging experiences. We traced the path that had been taken by the runaway, led by instinct where no human being would have dared to go alone and in the darkness of perpetual midnight. That dog had floundered through mud-banks, swum rivers, threaded intricate passages, always taking the short-cut, with no other guide than his mysterious gift of orientation—the same sense that pilots homing pigeons on their aerial voyages. By contrast with this perfect and fearless operation of instinct, the story may be told of old Matt's escape under similar circumstances. The colored guide named was at work near the pits when he heard some young fellows approaching with song and shout, as if slightly inebriated. The ex-slave thought that "discretion was the better part of valor," and hid in a crevice, put his lamp out, and quietly waited for the revellers to pass by. On coming forth from his hiding-place he found that he had no matches. The hour was late and he determined to grope his way out. Suddenly his staff dropped into a pit of unknown depth. The brave guide swooned on the edge of the chasm. On coming to, he collected his wits and felt for the path with his hand, finally making his way to the surface. But it was an adventure that he could never tell of without a shudder.

Whatever route one takes will lead for some distance through the main cave—the great trunk from which all avenues diverge. As we proceed we are surprised to find ourselves following a well-worn cart road that presently enters a spacious rotunda. On our right are three huge vats, and a tall frame near by that once supported a large pump, but is now utilized for holding our superfluous wraps. These are relics of the old saltpetre works that have historic interest. The pioneers who followed in the wake of Daniel Boone were thrown on their own resources in all respects, The importation of gunpowder was attended with expense and difficulty. Hence, they sent out such strolling chemists as happened to be among them, to hunt for nitre-beds. One of these, Dr. Samuel Brown, of Lexington, Ky., made a journey of a thousand miles on horseback, in 1806, in order to inform the American Philosophical Society that the caves of Kentucky were rich in saltpetre. The statement made by this ardent patriot was remembered when the War of 1812 was waged with Great Britain. Other sources then being cut off, the Government, throughout that sanguinary conflict, was dependent on the miners of the Ohio Valley for the means of making gunpowder wherewith to repel the invaders.

The process of manufacture was as follows: The nitrous earth was carted out from various avenues in hoppers where cold water, conveyed by wooden pipes, was poured over each charge, whence, in a day or two, a strong solution of the salts would run into the vats already mentioned. From the vats the liquor was pumped into a second set of pipes so tilted as to let it flow out of the cave, to be boiled and afterwards cooled in crystalization troughs. When ready for transportation, the crystals were carried on pack-mules across the mountains to the sea-board and put to a practical use. The business was carried on by the firm of Gratz and Wilkins, whose agent, Mr. Archibald Miller, declared that this one cave alone could supply the whole world with saltpetre. The contract for 1814 netted the managers $20,000. When the war ended the demand fell off, so that the manufacture was stopped and has not since been resumed. We get an idea of what was done by the mountains of lixiviated earth cast up on both sides of the old cart-road, and that is now almost as hard as stone.

The stalls are still exhibited where the oxen were tied and fed, their halters being made fast by means of cavities called "pigeon-holes," and that were worn smooth by frequent use. The old ruts are remarkably preserved, as well as the prints of the ox-hoofs made more than eighty years ago. Those miners led rough lives, but did thorough work, upturning every stone where they thought there might be any "petre-dirt," as they called the nitrous earth. And when the Sabbath came they kept it as a day of rest, and were accustomed to gather in the rock chapel, bearing the name of the Methodist Church, where the logs are in place that served them as benches. Now and then a sermon is preached from this ancient and historical natural pulpit.

A trustworthy legend is connected with the family of Mr. Gratz, an early owner of the cave. He was of Hebrew stock, and had a charming daughter, Rebecca, with whom Washington Irving had a pleasant acquaintance. On a visit to Sir Walter Scott, Mr. Irving told the "Wizard of the North" about her; and thus, as we are assured, the pretty Kentucky Jewess, Rebecca Gratz, became the model of the renowned Rebecca of *Ivanhoe.*

Another legend is to the effect that when Audubon, the ornithologist, visited Rafinesque, in his Kentucky cabin, he caught a remarkable bat by knocking it down with the eccentric Frenchman's violin. Rafinesque had his revenge by naming the series of rooms where myriads of bats hybernate, Audubon Avenue. It used to be called Bat Avenue. At its entrance two skeletons were exhumed by the miners, one of a child, and the other of a giant. This fact seems to be well substantiated.

No one can tell what surprises may be sprung upon a cave-man. There is a place near the end of Audubon Avenue, in the so-called Little Bat Room, where a narrow crevice opens into a pit. The miners had an idea that it must be very rich in nitrous earth. One of them in making an examination dropped his lamp down this crevice. He climbed down a little way into the ugly black hole and felt for his lamp with a stick. The stick itself, however, slipped from his grasp and went rattling down into an abyss. The lamp was a simple affair. But as it could not be replaced without a journey of nearly 200 miles, its loss was a serious matter. Accordingly a sprightly young negro was let down by a rope, as a sort of animated plummet to gauge the depth of the pit. He failed to recover the lamp ; but he described such a magnificent underground temple that the report was current for a generation that the lad had lost his wits. Thirty years later Matt, the guide, made his way from another direction into what is now called the Egyptian Temple, and there came across both lamp and staff lying near its splendid columns. There are six of these in all, averaging eighty feet in height and twenty-five feet in diameter. They stand in a semi-circle flanked by pyramidal towers. The material is gray oolite, fluted by deep furrows, and veneered with yellow stalagmite, rich as jasper, and covered by tracery as elaborate as Chinese carving. The floor slopes down from the vicinity of the pillars, while the roof gradually ascends until at a point perhaps 400 feet away, the distance between the dome above and the gulf below exceeds 200 feet ; and there a waterfall tumbles from an invisible source to the black pool that receives it into its bosom. And thus the little darkey, whose name even is unknown, found what was as marvellous as aught revealed by Aladdin's wonderful lamp, but found none to credit his fantastic tale.

Resuming now our exploration of the Main Cave, from which we have digressed, we find new objects commanding our attention as we advance. During a moment's pause we seem to hear the ticking of a musical clock. It is but the dripping of water in a hidden recess, measuring time as it doubtless has been doing for a thousand years. Near by is Wandering Willie's Spring, named for a blind boy who went wandering over the country with his violin. He wanted, as he said, " to see the cave for himself." Of course he lost his way ; and when found by his companions, he was quietly sleepin by the limpid basin that has carried his name ever since.

Singular effects are produced by the devices of the guides. At a certain spot we are requested to stand still and extinguish our lamps for a few moments, while one of the guides burns magnesium at a point back of us. The result is a splendid view of the Grand Arch, and also of a remarkable shadow profile cast by the projecting buttresses. We are assured that it is an exact likeness of Martha Washington ; and there really is some resemblance to that "first lady of the land." When the lamps are re-lighted, we are also shown gigantic silhouettes made on the ceiling by incrustations of the black oxide of manganese. A whole menagerie is on exhibition, including a side-show of a giant and giantess playfully tossing papooses to and fro. We first ridicule these grotesque fancies, and then are fascinated by them. By the way, the etymology of the word "grotesque" is interesting ; it means, like what we find in grottoes, just as "picturesque" means, like what we see in pictures.

It is well to observe with care the large rock on the right that resembles a mighty sarcophagus. The Giant's Coffin is one of the most important land-marks in the cave. It equals in size one of the famous blocks of Baalbek, being forty feet long, twenty wide and eight or more deep. Often as I have passed it, whether alone or with a hundred companions, it has ever been with a feeling as if I had intruded into some sacred mausoleum.

At a point a hundred yards beyond the Giant's Coffin, the trend of the Main Cave turns upon itself at an acute angle on the left, and sweeps around in a magnificent amphitheatre on the right. A rude monument is here erected in memory of the gallant McPherson. More than 300 such piles have been reared in different parts of the cave, each tourist who chooses adding a stone. An incidental advantage of the custom is that it has helped to clear the paths.

The roofless remains of two stone cottages are next visited, as having a melancholy history. These and ten frame ones, now torn down, were built in 1843, for the use of fifteen consumptive patients, who took up their abode here, induced to do so by the uniformity of the temperature, and the oxygenated atmosphere, which has all the purity, without the rarity, of the air found in high altitudes. The second stone house was used as a dining-room; but all the rest were lodging-rooms and were well furnished and comfortable. Nine stood in this vicinity; but the remaining three were in other parts of the cave. This interesting experiment was thoroughly tried, but proved to be an utter failure; as did also the pitiful attempts of the poor invalids to make trees and shrubbery grow around their dismal huts.

A strangely beautiful transformation scene is exhibited in the Star Chamber, a hall several hundred feet long, about seventy feet wide, narrowing upward to a ceiling sixty feet above our heads. The gray walls are in contrast with the lofty black ceiling coated with the black oxide of manganese; and this again is studded with thousands of white spots, caused by the efflorescence of the sulphate of magnesia. The guide, in order to show off the chamber, seats us on log benches by the wall, takes all our lamps and vanishes behind a jutting rock; whence, by adroit manipulations, he throws shadows flitting like clouds athwart the starry vault. The illusion is complete. The roof seems to have been lifted to an immense distance, and an imaginative person can easily be persuaded that he is actually gazing from a deep cañon up to the starry sky.

With an abrupt leave-taking the guide plunges into a gorge and we are left in utter darkness, and in silence so absolute that one can hear his own heart beat. While we question each other as to the meaning of this, we see in the distance a faint glimmer, like the first streak of dawn. It tinges the tips of the rocks, like the tops of hills far away. The horizon is bathed in a rosy glow, and we are prepared to see the sun rise, when the guide appears, swinging his cluster of lamps, and asking how we like the performance. Loudly encored, he repeats it—starlight, moonlight, thunderclouds, midnight and day-dawn, the latter heralded by cock-crowing, the barking of dogs, lowing of cattle, and other barn-yard sounds, in which the ventriloquial guide is an adept.

Few visitors go further than this in the Main Cave, although it is well worth exploring to the very end. We pass along under a mottled ceiling that changes from a starry to a mackerel sky. We find many curious objects. There are snow-drifts of native Epsom salts whitening dusky ledges. There are ancient fireplaces covered by broad slabs of limestone. There are numerous halls, mostly being enlargements of the general passage-way. Proctor's Arcade, Kinney's Arena, Wright's Rotunda, the Black Chambers, Solitary Chambers, the Cataracts, the Fairy Grotto, are all worthy of description. But we pass them by in order to devote a little more space to what Bayard Taylor pronounced the grandest cavern room in the world. It is singularly designated as the Chief City. Taylor's estimate of its dimensions was "800 feet long, 300 feet broad, 125 feet high, and covering between four and five acres." It has just been accurately measured, and is 450 feet long, 130 wide, and covers one and one-third acres. But even this is an immense area, clothed as it is by eternal night, built in by walls of massive rock, and overarched by so vast a dome as to make us hold our breath, lest if silence were broken it would fall. Examination shows the arch to be one solid, seamless block of limestone that has doubtless been as it is now for thousands of years. Yet the ponderous rocks hurled about in the wildest confusion prove that mighty forces were once at play. All is quiet now, and the dust of ages rests on those huge blocks. Amid the interstices are bits of cane, such as the red men once used to fill with bear's fat and burn as torches, to light up their solemn councils, or to aid them in their search for hidden treasures of flint and alabaster. Bonfires used to be made of these cane-torches, which now have been really all destroyed or carried away. In lieu of them we burn red-fire and discharge rockets, which find room to explode before striking the distant walls. The dome seems to follow us as we retire, overarching us at every step, as we slowly withdraw from this pre-historic council-chamber of sagamores and dusky braves. The Main Cave has an average width of sixty feet throughout its entire length, and its height is rarely less than forty feet. No creeping nor crawling has to be done, although there is rough clambering at times.

Let us now return to the vicinity of the Saltpetre Works and explore the Gothic Avenue. At its junction with the Main Cave there is a noble amphitheatre with a narrow gallery sweeping across, and a rocky platform from which Edwin Booth once rendered selections from the play of Hamlet. Climbing a stairway we gain the highest cavern level, where everything is as dry as possible. Here, in a niche in the left hand wall, was long kept on exhibition the dried body of an aboriginal princess found by miners in a small cave in the vicinity. There were also a few genuine Mammoth Cave mummies, that were minutely described by Messrs. Gratz and Wilkins. These remains had not been embalmed, but were merely desiccated and kept from decay by the antiseptic properties of the nitrous earth.

In Register Hall guests are invited to leave their cards with the assurance that they will remain for years without mould or discoloration ; a statement to be taken with some allowance. There are in this part of the arcade various stalagmites and stalactites to which fanciful names have been given, such as the pillars of Cæsar, Pompey and Hercules, the Post Oak, the Elephant's Head, and the Old Arm Chair, in which it is said that Jenny Lind once sat and sang one of her sweet songs. Aside from the grotesque appearance of these gnarled and twisted columns, their most interesting feature is their extreme dryness. In one or two places I observed a few trickling drops ; but for the most part they were as dry as could possibly be. Hence they furnish no criterion whatever as to the age of the cavern. From certain other data it is concluded that Mammoth Cave and Niagara Falls were twins, both dating back to the Tertiary Age. Water worn rocks are pointed out that show conclusively that an underground stream once swept through these halls, now so arid. But that must have been long ago. For the dust is often ankle deep, and when tossed into the air falls back like shot. So utterly free from moisture is it that not a particle of it will cling to the trailing robe nor stain the polished boot. Consequently the air is both chemically and optically pure, except as it may be made otherwise by our torches and fire-works.

Vulcan's Shop, the Lover's Leap, Lake Purity, Elbow Crevice, and Napoleon's Dome, are among the objects pointed out to us as we proceed to the end of this interesting avenue. On old maps of the cave a certain room used to be called the Haunted Chamber, on account of an adventure that befell one of the miners, a raw hand, who had trudged in here alone to dig his lot of "petre-dirt." He filled his sacks and started back, but lost his way, and to make matters worse stumbled over a stone and put his lamp out. Missing him at night-fall, his comrades hunted him up. When he saw them approaching, swinging their torches aloft and shouting, his excited imagination and his guilty conscience transformed them into so many devils, and he took to his heels crying lustily for mercy. It was with difficulty that the frightened wretch was brought back to his senses, and convinced that he was yet alive and in Mammoth Cave instead of in a worse place.

A more agreeable legend is linked with the Gothic Chapel and its charming Bridal Altar, where a Kentucky belle was wedded to a gallant young Southron, after having promised her mother not to marry any man on the face of the earth. When taxed with having broken her vow she insisted that she had kept it to the very letter, and that it was not marrying any man on the face of the earth to be joined to her own true love in this subterranean Gretna Green.

The region of pits and domes is usually included in the Short Route, but for the sake of giving a more clear idea of the cavern in its continuity, we shall defer our description of it until, after an interval of rest at the hotel, we undertake the more extended trip to the farthest end of the cave.

Meanwhile, by way of an interesting digression, let us visit a locality half a mile from the hotel, and that has long been known as the White Cave, but which is probably only an arm of the Mammoth Cave. The entrance when first discovered was so narrow as to make ingress difficult; but it has since been enlarged and is guarded by an iron gate. The first chamber has a rough and muddy floor, a low, flat and uneven roof, and is in shape an irregular oval. The second is considerably higher. Its floor is intersected by a number of crooked channels in which rills are constantly running, so transparent as to be almost invisible. There are many stalactites hanging from the ceiling, varying in size from a quill to a saw log. Among the finest specimens of dripstone are the Frozen Cascade, and a stately column named for the Baron von Humboldt. In a third and far larger chamber huge masses have fallen, encumbering the floor and making it certain that the passage-way has thus been blocked to rooms beyond. Around these ruins a wide canopy of alabaster has been drawn. The idea has long prevailed, which is undoubtedly correct, that a hidden avenue leads to the vicinity of the Crevice Pit in Mammoth Cave. Various attempts have accordingly been made to break through the mighty curtain in order to find the passage sought. Such a discovery would on many accounts be desirable, as it would enable tourists who enter one way to go out another, and also make accessible an exceedingly interesting suite of rooms.

A fact of great importance to palæontologists came to my knowledge during the preparation of this lecture, not new indeed, but that seems to have been forgotten even by scientists. Some seventy years ago, Mr. Clifford, a Kentuckian, exhumed from the floor of the White Cave a number of huge fossil bones that, after passing through several hands, finally came into the possession of the Academy of Natural Sciences at Philadelphia. Some of these bones were identified by Dr. Harlan as those of the bison, stag and bear; while others, in an excellent state of preservation, belonged to a young Megalonyx, of a different species from the one found by Thomas Jefferson in a cave in the Greenbrier valley in Virginia. Along with these bones of animals were found fragments of a human skeleton, though not necessarily of the same era. Indeed the remains of the bear alone seem to have been contemporaneous with those of the Megalonyx. Dr. Harlan's conclusion was that the latter was about as large as an ordinary ox, and had attained three-fourths its mature growth.

Resuming now our exploration of the Mammoth Cave, we prepare for the Long Route. As it requires an all-day tramp, servants accompany us with baskets of provisions in order to spread a lunch at a convenient place beyond the rivers. Extra oil-flasks are also carried by the guides to replenish the lamps when necessary. Down we go again into the cave's dark mouth, under the thick horizontal plates of gray limestone, from whose green, mossy ledge falls the wild, pattering rill; and then advance for perhaps a mile amid some of the scenes already described.

On reaching the Giant's Coffin we leave the Main Cave by creeping through a crevice behind that huge monolith, and enter the Deserted Chambers. To our left, as we advance, is the opening to a long and serpentine avenue, or succession of avenues, that have been connected by the untiring energy and skill of Mr. H. C. Ganter, and made accessible to visitors. It has branches leading to huge domes and pits, a resounding waterfall and charming "floral" regions; but its chief interest lies in the fact that by this passage visitors may now reach safely portions of the cavern that were formerly unapproachable whenever the rivers were flooded, as they generally are in winter. This is really the most important and costly improvement made here for a long time, and in honor of the manager by whom this difficult engineering feat has been accomplished, it has been agreed to name the entire combination of passage-ways "Ganter's Avenue," which is certainly more attractive than the old name of "Black Snake" or the unmeaning one of "Welcome Avenue," both of which are to be henceforth discontinued.

Preferring the more frequented path, however, we turn to our right, instead of to the left, descend a steep stairway, and pause for a moment beside Richardson's Spring, visited by the Indians long before it was discovered by white men. About 150 yards beyond the limpid spring yawns a chasm called from the peculiar shape of a projecting rock, the Side-Saddle Pit; above which is Minerva's Dome. Descending by a sloping path to a lower level, fifty yards beyond, we enter the Labyrinth, where we presently find ourselves peering through a window-like aperture into profound darkness. The guide thrusts blazing rolls of oil-soaked paper through a similar window, thus disclosing indescribable wonders to our gaze. This is the famous Gorin's Dome. Its total depth is said to be 117 feet to its lowest point, while the height of the vault overhead seems to be fully 100 feet, making 217 feet the total altitude of this mighty chasm. The perpendicular walls are draped with stalagmitic curtains whose folds seem to be loosely floating but are really of solid stone. These hangings, dight with figures rare and fantastic, were woven in Nature's loom by crystal threads of running water. Putnam's and Hovey's cabinets are smaller domes, where concretions known as cave pearls are found. The Labyrinth ends in Ariadne's Grotto.

Retracing our way we next visit the profound abyss styled the Bottomless Pit, above which expands Shelby's Dome. It is a double pit, being nearly divided by a tongue of rock that juts into it for 27 feet or more, from whose point Stephen, the guide, in 1837, threw a ladder across and for the first time explored the regions beyond. A substantial bridge now spans the abyss. By line and plummet the depth is only 95 feet on one side and 105 on the other. Shelby's Dome overhead may be 65 feet, and the space between about 15 feet, making 180 feet the entire distance from top to bottom of the great chasm.

The treacherous Covered Pit had been known for years, but no visitor ever crossed it until I did so, following William the guide. Once fairly beyond the loose slabs between which the black depths seemed to be lying in wait for the heedless explorer, we were on *terra incognita.* Creeping cautiously along, we presently discovered twin pits with a ridge but six feet wide between. These I named Scylla and Charybdis. Climbing down for a few feet into Scylla we found a ledge from which we lowered a lamp into the deepest part of the pit, getting a good view of the wrinkled and corrugated sides. At length the lamp caught on a projection—or more probably, as I now think, reached the bottom—and the cord was burned off, and what remained measured 135 feet. Mr. Ben Hains recently measured the Covered Pit, and found it to be but 47 feet deep. Pit No. 2 is 80 feet, and Pit No. 3 is 30 feet deep, with an aperture to a lower pit 59 feet deep, making 89 feet in all. Mr. Hains found Charybdis to be but 79 feet deep. Beyond the latter is the farther edge of the Bottomless Pit, opposite the crossing by bridge. While making my measurements a large fragment of limestone, dislodged by the guide, rolled past me and went thundering into one of the pits.

Returning as we came, we next pursued a narrow crevice that led us to a point near the bottom of the Bottomless Pit, whence we saw volumes of smoke emitted through an opening from Charybdis. This led me to suspect that all the pits thus singularly clustered together are really united with each other. The truth of this conjecture has since been confirmed by Mr. Hains' explorations. This gentleman entered an opening from the room called "Great Relief," and following a serpentine passage for half a mile finally emerged into Charybdis. He found, as I had surmised, that seven or eight pits unite at the bottom to form a magnificent hall, that varies in width from 10 to 50 feet, and in height from 35 to 135 feet. The floor is very uneven, rising in high and pointed hills between the pits above. This new and vast apartment we have named, "Harrison's Hall," in honor of the President of the United States. The figures on following pages will aid to an understanding of its peculiarities.

Beyond the region of pits and domes, Mammoth Cave forks into two passages. That tending to the right is Pensico Avenue, a mile long, and exquisitely arched. It contains among its objects of interest a grotesque resemblance to a sea turtle, a large white column called, for some unknown reason, the Pine Apple Bush, the Hanging Grove, Wild Hall, Snowball Arch, Matt's Arcade, Angelica's Grot, and a remarkable place styled the Grand Crossing, where four avenues meet. Pensico Avenue runs back toward Green River, in a direction parallel to the Main Cave, suggesting a possible outlet.

Returning to the Reveller's Hall, we follow a low passage, four feet high, that ends in the Scotchman's Trap, a circular opening overhung by a ponderous slab that seems as if a careless breath might make it fall. A canny Scot came in thus far and refused to proceed lest he should be buried alive. Hence the name. But we dive under and go on. Next comes the Fat Man's Misery, a long, winding way that originally must have drained the region of pits, with walls 18 inches apart, the average height being but five feet, and that changes its direction

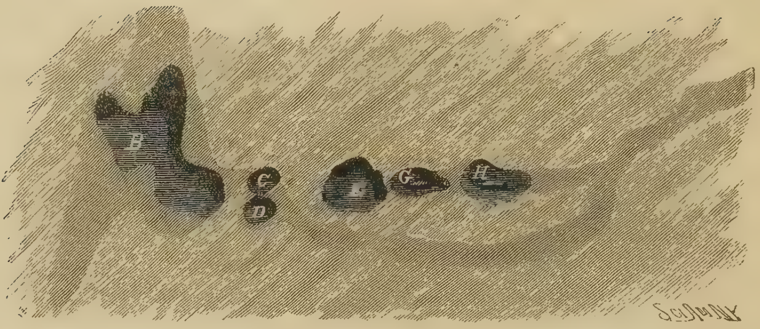

Fig. 1.

eight times in 236 feet. The sides are beautifully marked by waves and ripples, and polished by the friction applied by thousands of visitors. We straighten our spines in a room well named Great Relief, and then anxiously ask if there is any other way out than that twisted pass. The guide replies that we can go out by the Corkscrew, which, as we find on our return trial, is an intricate web of fissures conducting us up through a chaotic region, where we crawl through crevices and leap from rock to rock, for what would perhaps be a vertical distance of 150 feet, aided here and there by ladders, thus greatly shortening the trip. Those who come in one way generally go out the other, and regard the last way chosen the worst, whichever it may have been.

The Odd-Fellows' Links, Bacon Chamber, and a few other localities receive attention, and then the guide introduces us at once to River Hall, where are to be seen the most wonderful subterranean waters ever yet discovered. Only the faintest idea can be given of the gloomy wildness of this region. Our path first skirts the edge of cliffs sixty feet high and a hundred feet long, below which lie the sullen waters of the Dead Sea, whose

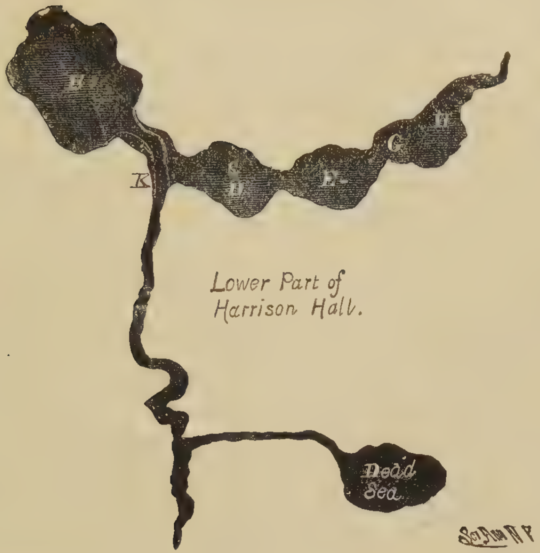

FIG. 2.

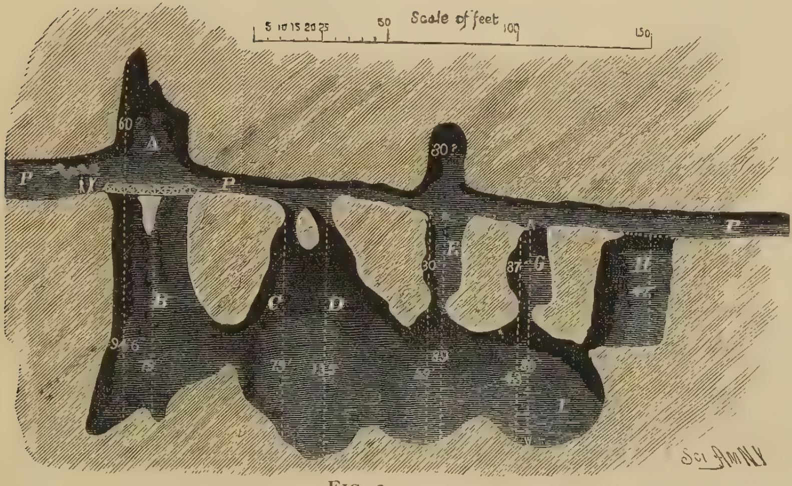

FIG. 3.

Explanation to cuts. Figure 1, Upper Orifices of the Pits. Figure 2, shows the horizontal Plan of the Hall. Figure 3, gives a Vertical Section. *A*, Shelby's Dome; *B*, Bottomless Pit; *C*, Charybdis; *D*, Scylla; *E*, Pit No. 3; *G*, Pit No. 2; *H*, Covered Pit; *I*, Sandstone Debris; *K* Lower Entrance to the Hall; *P*, General Pathway.

flavor is not saline, like its oriental namesake, but quite palatable. Descending a flight of steps, we proceed to the river Styx, diverging for a moment to see a cascade falling into a funnel-shaped hollow. It was in this vicinity that I found, in 1881, a natural mushroom bed, which led to some extensive experiments at subterranean mushroom farming.

The Styx used to have its ferry and its modern Cerberus ; but now a natural bridge has been discovered, by means of which we cross over to the shores of Lake Lethe. Each of these bodies of water is about 400 feet long and 40 feet wide. A narrow path runs along the margin of Lake Lethe, at the foot of cliffs 90 feet high, to a bridge at the neck of the lake. Our path next follows a winding and rippling stream, which sometimes flows out from and at others into the dark lake just mentioned. This reversion of the current has never been satisfactorily explained.

Four varieties of blind fish have thus far been discovered. None of them are very large, the average size being about two inches in length. The largest thus far caught was six inches long, and was bought of the guide for ten dollars by a snob, who proudly had the costly fish served for his breakfast the next morning! These tiny fish are colorless, have cartilage instead of bones, are viviparous, and are so sensitive that if a grain of sand should fall on the water, they will dart away with rapidity. Blind crawfish are also found here, whitish, semi-transparent, with remarkably long antennæ and more delicate in every way than those found in outside streams. These also are highly sensitive and not easily captured. The total list of cavern fauna is not very great, after excluding animals known to be accidental visitors. Making allowance for synonyms, we find no more than one hundred species in all. Yet insignificant as they seem to the careless eye, they have received abundant attention from scientific men, and names big enough for whales and mastodons, instead of crickets, spiders, flies, fleas, worms and minnows.

The food supply of cave animals is scanty. Most of them are scavengers, subsisting on decaying wood, dead leaves, etc., swept in by the waters, or on relics left by human visitors. Cave spiders spin webs to catch cave flies, as is done in the upper air. Blind fish live on blind crawfish, when they can catch them, and these in turn extract smaller crustacea with their claws from under the flat stones where they hide. Aquatic plants here are not green, like their open water congeners, but are pellucid and bleached. Indeed the law is universal that all true cave fauna and flora are either without color or nearly white. There is a striking similarity between the deep-sea animals and those found in caves. The whole subject is profoundly interesting from its lessons as to the retardation and development of life ; but those wishing to pursue this line further are referred to the publications of Telkampf, Dekay, Packard, Cope, Putnam, S. I. Smith, and others.

There are several other subterranean streams besides those already mentioned. But we shall only describe our exploration of the famous Echo River. This is a body of water varying in width from 20 to 200 feet, and estimated to be three-quarters of a mile in length. Its depth, at ordinary stages of the water, is from 10 to 40 feet, and the roof rises above the surface to a corresponding height. A flotilla of uncouth little flat-boats is kept on the river, some at one end and the remainder at the other, the materials for which were all brought in through the Fat Man's Misery, being afterwards put together. It is a fine spectacle to see eight or ten boats, each carrying from ten to twenty passengers, with an ample supply of lamps, and an occasional discharge of fireworks, following each other, their crews meanwhile tempting the marvellous echoes by shout, scream and song ; laughter, whispers and yells ; rattling pistol shots, flute solos and bright arpeggios on the cornet—all of which are faithfully reproduced, though occasionally with remarkable variations. The long vault has also a certain key-note of its own which, when firmly struck, excites harmonics of incredible depth and sweetness.

Last summer, in company with a party of four, no others being on the river at the time, we tried the effect of rocking the boat as violently as we dared to do, also striking the edge and the surface of the water with our paddles, and in other ways making as much agitation of the body of the stream as possible, and then awaiting the result in silence. I timed the concert thus created, and found its duration to be exactly half-an-hour! First came sounds like the tinkling of silver bells. Then larger and heavier bells took up the melody as the waves sought out the cavities in the walls. Then it was as if all chimes of all cathedrals had conspired to raise a tempest of sweet sounds. For a moment there was utter silence, soon broken by low mutterings, ghostly whispers, sudden shrieks, as if of men in agony. Then silence again. We were about to speak, when the guide motioned to us to remain quiet. When, lo! as from some deep recess, hitherto forgotten, came a tone tender and profound ; after which, like gentle memories, all the mellow and mysterious sounds that had gone before were re-awakened until river hall rang again with the wondrous harmony.

A rocky inlet receives our craft as we land at Cascade Hall. We tread a pathway of solid stone leading through Silliman's Avenue. We climb cliffs, or dive under hanging rocks, or step aside to explore an attractive arcade, or a snow-drift of fibrous gypsum, as the case may be. We note the successive tiers, or galleries, showing how the cavern floor, from age to age, has dropped down to its present level.

El Ghor, which is but a continuation of the same avenue, contains many interesting objects, conveying valuable lessons in mineralogy and geology. Rhoda's Arcade, on our left, leads to Lucy's Dome, which I regard as the most symmetrical and lofty dome in the cave. Corinna's Dome rests directly over El Ghor, while Stella's Dome is reached by a narrow crevice further on. El Ghor is said to lead to a stream known as the Mystic River, though I have not yet verified this statement. Visitors usually leave the gorge at a small basin called Hebe's Spring, by climbing a ladder one at a time and going through a hole in the roof, to an upper tier, where they find themselves in a stony vineyard. Nodules and globules simulate clusters on clusters of luscious grapes, burdening hundreds of boughs, and gleaming with party-colored tints through the dripping dew.

Washington Hall is but a smoke-stained lunch-room, strewn with relics of hundreds, and possibly thousands of dining-parties, while along its walls are fragments of bottles, rusty tin cans, and other reliquiæ of underground feasts. While we dine, the guides fill the lamps from oil-cans kept here for the purpose. The ceiling of the Snow-ball room is dotted with hemispherical masses of snowy gypsum. Marion Avenue has two branches, one leading to Zoe's Grotto, and the other to Paradise, Portia's Parterre and Digby's Dome. These are highly interesting localities, but are not on the regular route, which, as we follow it, takes us next to that very treasure-house of alabaster brilliants, named for the mineralogist, Cleveland's cabinet.

Imagine a series of arches of 50 feet span, where there is a mimicry of every flower from the modest violet to the flaunting helianthus. Examine any one of these cave flowers—the "oulopholites" of the mineralogist. From a central stem gracefully curl countless crystals, fibrous and pellucid ; each crystal a study ; each fascicle of curved prisms wonderful ; and the whole blossom a miracle of beauty. Multiply this mimic flower from one to a hundred, a thousand, a myriad. Move down the dazzling vista, as if in a dream of Elysium—not for a few yards, or rods only, but for one or two miles ! All is virgin white, except here and there a patch of gray limestone, or a spot bronzed by some metallic stain, or as we purposely vary the lovely monotony by burning colored lights. Midway is a great floral cross overhead. Clusters, wreaths, garlands embellish nearly every foot of the ceiling and walls. The very soil sparkles with trodden jewels. I picked up one of these gems, and had it magnified five hundred times and then photographed, merely to show how absolutely perfect it is. The fancy finds every flower of the green-house or parterre in this crystalline conservatory. Sprays of asters, drooping fuchsias, spikes of tuberoses, wax-leaved magnolias, blanched tulips—but why try to exhaust the botanical catalogue? They are all here, and patient search will find them, every one.

Charlotte's Grotto is the crowning glory of this fairy-like region. I had often heard it extolled, but never having seen it in any of my trips, I made particular inquiry. No one seemed to know anything about it. Finally, on hearing a comely colored matron at the hotel addressed as "Aunt Charlotte," I sought information from her concerning the locality bearing her name. She told me that the grotto was named for her by Stephen Bishop, her former husband. Her nephew pilotted me to the spot, where I found all the wonders that had been so graphically described by Professor Locke, Bayard Taylor and other early visitors. There the pendulous fringes of the night-blooming cereus are rivalled by snowy plumes floating from rifts forever safe from the withering glare of daylight; and thanks to the convenient forgetfulness of the guides these marvels have been thus far kept from spoliation by thieving curiosity-hunters.

Beyond the fairyland the cave divides into three branches. That on the right leads to the Sandstone Dome. The middle branch is Franklin Avenue. We followed the left-hand path, over the Rocky Mountains (100 feet high) and on to Croghan's Hall, the end of the Long Route. Here is also the Maelstrom, a pit said to be 175 feet deep. Into this abyss Mr. W. C. Prentice descended by a rope, some years ago, and met with various thrilling adventures that have been done into verse by Rev. George Lansing Taylor. It is related of Dr. John

Croghan, for whom the above-mentioned hall is named, that during his foreign travels he was continually inquired of about Mammoth Cave ; and when obliged to confess that, although a Kentuckian, he had never seen the greatest wonder of his State, it so mortified him that, on returning home, he paid the cavern an immediate visit. Shortly afterwards he bought it, and devoted much time and money to the development of the property. At his death he left it to his nephews and nieces, by whom it is still owned, though under the exclusive management of their agent, Mr. H. C. Ganter.

In this condensed description but a few of the many rooms and avenues catalogued have been even mentioned. Prof. D. D. Owen says that 225 halls and passages have been explored and named, and that the chemical and mechanical action of water have here displaced twelve million cubic yards of limestone !

Visitors usually rest for a while on the rustic seats near the entrance before climbing the hill to the hotel. Here the inner and outer atmospheres mingle. By contrast with the pure, oxygenated air of the cave, the odors of the outside world, of the trees, grass, weeds and flowers, is strangely intensified, and for many delicate natures overpowering. The guides tell us that, in accomplishing the long and short routes we have journeyed more than twenty miles under ground. They assured me that in my tramping in and out on repeated visits, I had travelled more than 200 miles. None of us feel like disputing such assertions. We are satisfied—satiated. Though gaining less definite knowledge than might be desired, we have had a surfeit of adventures, conjectures, guesses and mysteries. Feelings akin to friendship have sprung up within us, however, for grand old Mammoth Cave. And it is with positive regret that we finally turn away for the last time from the fern-fringed chasm lying there in the soft moonlight, where the sparkling cascade throws pearly drops from the mossy ridge, and spreads its mist like a silver veil.

GEOGRAPHICAL NOTES.

The North Polar Region.—Capt. Diego J. Ferraro, of Mexico, has put forth a pamphlet in English, affirming that the regions of the North Pole were habitable in the primeval times of our planet, and have again become habitable, "perhaps forever." If it were "rigorously necessary" to prove his assertion, Captain Ferraro would extract the proofs from his unpublished work, entitled: "The Forces in Nature, or the Laws of Equilibrium and Motion in the Universe." Under the circumstances he does well not to make the extract, for the work contains a "Titanic principle," which he had the good fortune to discover in an unforeseen manner, and this principle furnishes a solid basis to the learned reflections of the late Captain Symes, better known as Symmes, who bored a hole through the earth from pole to pole. On this basis rests also the North Polar Paradise, where the Regeneration of the World is to begin, and this paradise is to be reached by a railway in Greenland. This railway is to be constructed by the United States, or by the combined efforts of all civilized countries, or,—and this is the eftest way,—by a company, which Captain Ferraro will organize under a concession, to be granted by the United States.

America has her Symmes, and England her "Parallax" Hampden, and Mexico,—the greatest is behind,—her Ferraro:

> The force of Nature could no further go;
> To make a third she joined the other two.

UNITED STATES BOARD ON GEOGRAPHIC NAMES: BULLETIN NO. 1.—This Bulletin, which is dated December 31, 1890, gives the decisions of the Board with regard to 226 names. The principles observed are good, though somewhat rigid; and one, the familiar "Leave well enough alone," has been omitted. Most of the decisions recommend themselves, but it is no improvement to adopt *St. Croix*, which is neither French, nor English, nor Danish, in place of *Santa Cruz*, the name bestowed by Columbus. The true name of the Spanish island is *Puerto Rico*, but *Porto Rico* has acquired rights in English; and *Congo* will not give way to the arbitrary form *Kongo*.

These changes are matters of opinion, but nothing can be said for the decision in the case of *Sausalito*, described by the Board as "A post office in Cala., U. S." The post office is in a village on San Francisco Bay, five or six miles to the N. W. of San Francisco, and there known as *Saucelito*, a form which preserves, at least, the etymology of the real name, *Sauzalito*, the diminutive of the Spanish word *Sauzal*, "a ground planted with willows." There are persons in California who write *Sausalito*, but they spell Cincinnati with an S; and the Official Register of the United States, which lends its support to the Board on Geographic Names, cares for none of these things. A Spanish dictionary is the right authority.

The difficulty of the task assumed by the Board grows greater the more it is considered. The field of revision and correction is literally as wide as the world, and it may be affirmed that the work will never come to an end. Even in the most highly civilized countries the human proneness to error has produced strange results in nomenclature. The writings of Col. de Rochas on the Provençal names furnish many examples of mistakes, which have established themselves in French books and maps and records, to the confusion of sense and etymology. In most cases the similarity of sound has suggested a supposed French equivalent for the Provençal word. In the valley of Bardonesche, the village of *Milaures* (a thousand winds) masquerades as *Mylords;* the *Champ de la Lioure*, (the Field of the Hare) in the commune of Le Sapey, is known as the *Chandelier;* the sandy tract of *L'Arénié* is turned into *L'Araignée* (the spider); and the *Jas de Ghigo* (herding place) near Bausset, in the Department of Var, is transformed into the *Jus de Gigot* (leg-of-mutton gravy).

The conclusion is that names must be studied and treated with respect.

THE NAME "AMERICA."—Dr. G. Hellmann contributes to the *Verhandlungen* of the Berlin *Gesellschaft für Erdkunde*, Band XVII, No. 8 und 9, a report on the Eighth International Congress of Americanists, which held its sittings in Paris during the week of the 14–20 October, 1890. Dr. Hellmann was one of the Vice-Presidents of the Congress, and occupied the chair during the first day's session.

The first question brought up was that of the origin of the name "America," and the theory concerning it advanced by Mr. Jules Marcou, "a Frenchman residing in New York."* According to Mr. Marcou, Vespucci, whose true name was *Alberico*, changed this in 1503 or

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*This is an error. Mr. Marcou lives at Cambridge, Mass.

1504 into *Amerigo*, after he had become acquainted with the existence of the Amerrique Mountains in Central America. This is proved, for Mr. Marcou, by the fact that no such form as Amerigo is to be found in the Italian Saints-calendar.*

The Italian scholar Govi (now deceased), writing in 1888, says Dr. Hellmann, corrected Mr. Marcou's assertion concerning the impossibility of identifying the names Alberico and Amerigo. They are, in Florentine usage, one and the same name. A letter of Vespucci's, written before the year 1500 and now in the Gonzaga archives at Mantua, is signed *Amerigo Vespucci*; and Don M. Jimenez de la Espada, who spoke on the subject, mentioned that the name signed by Vespucci, in the letters and other documents preserved in the Archives of the Indies, at Seville, is sometimes *Alberico* and sometimes *Amerigo.*

An additional refutation of Mr. Marcou's theory was furnished by Dr. Hamy, who laid before the Congress the fac-simile of a Mappamundi, the work of Vallesca, of Majorca, dated in 1490, and with a written memorandum on its back that it had been bought by the merchant, *Amerigo Vespucci*, for 120 gold ducats. The original map had a curious history. It was for a time in the possession of George Sand; and eventually, though happily not till after the copy had been made, it was very seriously damaged by the upsetting of ink upon it.

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*Prof. Luigi Hugues remarks on this point: "I acknowledge with Mr. Marcou that the name *Amerigo* does not exist in the list of Saints as a prænomen; but neither is the name *Alberico* to be found there. There does exist, however, in the Roman Martyrology a Saint *Emerico*, a king of Hungary, who died in 1030, and is commemorated by the Church on the 4 of November; and this name passes easily into *Americo*." *Bollettino della Società Geografica Italiana*, Anno xxii, Vol. xxv, p. 522.

Mr. Pector, the Chief Secretary, called attention to the statement made some years ago by the President (Cárdenas) of Nicaragua that the Central American mountain chain described by Mr. Marcou was called, not the *Amerrique*, but the *Amerrisque* chain. "Here," says Dr. Hellmann, "I felt it to be my duty, after listening to some trivial objections offered by Mr. Lambert de St. Bris, to bring the discussion concerning the origin of the name "America" to a close, and to express the hope that the question would never make its appearance again on the programme of a Congress."

This is well. It was time to have done with Mr. Marcou's vagaries, and to dismiss the person who has pushed himself into view as T. H. Lambert, Thos. de St. Bris, and Lambert de St. Bris, and has wasted in the search for Amaracapana the golden years that should have been spent in looking for his own name.

THE ART OF DISCOVERY.—Mr. H. W. Seton Karr is winning a reputation. He contributes to the February (1891) Number of the *Proceedings* of the Royal Geographical Society an article on "Explorations in Alaska and North West British Columbia," accompanied by a map, presumably his own, of "The Chilcat country, Alaska and British Columbia." The journey was made in 1890; the map is dated 1891. Of this map Dr. Aurel Krause writes from Berlin, under date of February 17, in these words: "To my amazement I recognized in this map, provided as it was with a pair of new names, a somewhat reduced but substantially faithful copy of the very map which my brother published in 1883, together with a detailed description of the Chilcat country, in the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Bd.* 18, *Taf. IX.*" The identity is beyond question.

Dr. Krause found something to notice in the text of the article. Of Chilcat Inlet Mr. Seton Karr says, on p. 75, that it "was entirely unexplored as regards the passes into the interior as well as the interior itself. I must not forget to mention that one white man, Dr. Krause, had already ascended to a certain point and produced a fairly accurate map of the route he followed."

The *fairly accurate map* seems to have absorbed Mr. Seton Karr's attention, and to have left him no time for the perusal of Dr. Krause's twenty-one pages of detailed description in the *Zeitschrift.* If he had read the description of Chilcat Inlet, on p. 350, he might have thought twice before correcting the United States chart which, he says, "places the head of Chilcat Inlet some nine miles higher up the valley than is actually the case."

"This is," remarks Dr. Krause, "the single important point in which Mr. Seton Karr's map differs from that of my brother, whose determinations were accepted for the chart of the Coast Survey."

The explanation given in the *Zeitschrift* is that the mouth of the Chilcat River is an extended shallow estuary, which becomes a broad basin at time of high water, while at low tide it is a stretch of sand and pebbly shingle, over and through which run numerous little rills to the sea. Dr. Krause's *fairly accurate map* shows the river at high water.

Mr. Seton Karr discovered, in his ascent of the Chilcat River, a stream that flowed into it, and this stream he named the "Wellesley River." "I found afterwards," he says, "that it had an Indian name—Klaheena." This river appears on Dr. Krause's map as the *Tlehini*, in which the German *e* and *i* represent the English *a* and double *e*. Initial *k* and *t* are interchangeable in many uncultivated tongues, though Mr. Seton Karr apparently hopes that his readers will not remember this fact.

There are two ways of profiting by the labors of other men. One inspires confidence, the other absolute distrust; and Mr. Seton Karr has himself to thank, if his name at the head of an article, or on the title-page of a book, puts every man on his guard.

THE "SOCIETA AMERICANA D'ITALIA."—This Society was founded in 1888 and reorganized under the present constitution in September, 1890. It has for its objects the cultivation of American ethnography, anthropology, archæology, linguistics, history and natural history, and the encouragement of these studies in Italy. Italians and foreigners, wherever they reside, are equally eligible for membership, and are entitled to receive without charge the publications of the Society. The annual dues are 10 lire ($2) and a single payment of 200 lire ($40) secures a Life membership, free of dues. The publications are: A Year Book, containing the list of members, Transactions, etc., and Memoirs, separately issued, on subjects within the scope of the Society.

Forthcoming Memoirs are:

Constructions of the Native Americans, Voyages of the Zeni, by F. Borsari; Penal Systems of the Aztecs and the Incas, D. De Pilla; Anthropological and Ethnological Studies of the American Aborigines, M. Centonze; Social and Political Organization of the Aztecs, F. Ciccaglione; Translation of the Quichua drama, *Ollantai*, E. Giunti; Unpublished MS. of the 17th Century on Mexico, N. Parisio; Translation of the Quiche drama, *Rabinal-Achi*, L. Patalano; Intertropical Zones of America (Studies of Comparative Climatology and Pathology), L. Sambon.

Many eminent men are on the Council of the *Società*, and the president is Prof. Ferdinando Borsari, the distinguished Americanist.

Until November, 1892, the headquarters will be in Naples, where the address of the Chief Secretary is: Dr. L. Sambon, via Gennaro Serra, 24, 1mo. po.

TYPE OF AN AMERICAN INDIAN IN AN ANTIQUE BRONZE OF THE LOUVRE.—Prof. Ad. de Ceuleneer, of the University of Ghent, has brought out a memoir, read to the *Académie royale de Belgique*, on the subject of a fragment of Cornelius Nepos, as illustrated by an antique bronze, No. 826 in the collection of Edmond Durand, purchased for the Louvre in 1825 by Charles X. This bronze is described in the catalogue as follows: "Bust of a slave, entirely shaven, with large loose ears. The top of the skull opens on a hinge and forms a cover. Above the ears are rings in which works a moveable handle made to represent the branch of a tree with nodes. A bucket (situla), about 8 inches in height."

The history of the bronze is unknown, but the workmanship of it is excellent, like that of the best epoch of

Roman art; and M. de Ceuleneer thinks it may belong to the first century B. C.

The fragment of Cornelius Nepos has been preserved by Pomponius Mela and by Pliny the Elder. While the texts differ in the two writers, they agree as to the main incident: that a king, either of the Boti or the Suevi, made a present to Quintus Metellus Celer of some Indians, who had been driven by tempests to the coast of Germany.*

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* Pomponius Mela relates the story in these words. " Testem autem rei Quintum Metellum adicit, eumque ita rettulisse commemorat: cum Galliæ proconsul praeesset Indos quosdam a rege Botorum dono sibi datos; unde in eas terras devenissent requirendo, cognosse vi tempestatum ex Indicis aequoribus abreptos, emensosque quæ intererant, tandem in Germaniæ litora exisse."

De Chorographia, III, 5,45 (ed. G. Parthey, Berol., 1867).

M. de Ceuleneer rejects the idea that these Indians could have reached the coast of Germany by sea, driven by stress of weather from any quarter of that part of the world known to the ancients as India. He is inclined to believe that the Louvre bronze and the story told by Nepos explain each other, and that the former represents the head of an American Indian from some part of the Northern States of the Union.

He has made an ingenious and learned argument on a slight basis, and while his conclusion is within the limit of the possible, it is reached by faith and not by sight. The connection between the text and the bronze *situla* is assumed, and the considerations which make against it seem to be overlooked. It is not unusual to find, in every race, individuals who present the characteristic features of a wholly dissimilar ethnic type; and a work of art, as M. de Ceuleneer himself has remarked, bears no such testimony as a skull. The artist shapes his material according to his whim, and modifies or creates a type, at pleasure.

The written authority on which M. de Ceuleneer relies is not beyond reproach. All the manuscripts of Pliny give the reading *a rege Suevorum*, while there are numerous variations in the sixty manuscripts of Pomponius Mela. The best codex of these sixty is the Vatican 4929, which gives *a rege Botorum*. This is the reading, also, of eleven other good manuscripts, but M. de

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The account in Pliny is:

"Idem Nepos de septentrionali circuitu tradit Quinto Metello Celeri L. Afrani in consulatu collegæ, sed tum Galliæ proconsuli, Indos a rege Suevorum dono datos qui ex India commerci causa navigantes tempestatibus essent in Germaniam abrepti."

Hist. Nat. II, 67.

Ceuleneer rejects it, because we have no knowledge of a people or a tribe by the name of *Boti.* The principle that is applied in one case may be applied in another. We have no record of a voyage like the one reported by Mela, and there may be more than one error in his text. He is, moreover, the sole authority for the tale, which he takes from Nepos, and Pliny merely repeats the statement of Mela.

Why may not the word *Indos* have been, in the first instance, a copyist's blunder for *Iernos* (Irish) or *Iberos* (Spaniards)? If it is not easy to believe that even an Irish or a Spanish vessel of the first century, B. C., could find its way to suffer shipwreck on the coast of Germany, it is less easy to believe this of a bark manned by North American Indians. The indefiniteness of the word, *Indos,* allows latitude for speculation. Europe to the north and east of the Baltic was an unknown world to the ancients. If there is any truth in the story of the slaves presented to Quintus Metellus Celer by the German king, they were, no doubt, men of a yellow or brown complexion, and they belonged, perhaps, to some tribe of the Finnish race.

THE GREAT FROST OF 1890–91.—A paper on this subject by Mr. C. Harding was read at a meeting of the Meteorological Society, London, on the 18th of February.

It was shown that over nearly the whole of the south-east of England the mean temperature for the period November 25—January 22, was more than 2° below the freezing point, while on the coasts of Kent, Sussex and Hampshire the mean was 32°. In the north of Scotland and the west of Ireland the mean was 42°. The mean for middle-southern England was more than 10° below the average. In the north of England it was less than 5°, and in Scotland less than 1° below the average. The lowest temperatures were 0°.6 at Stokesay, in Shropshire, and 1° at Waddon, in Surrey. The greatest cold was felt at the end of November.

At many places in England the frost was continuous night and day for twenty-five days, and in Regent's Park the skating was uninterrupted for forty-three days. The cold was more prolonged in the neighborhood of London than at any time for the last hundred years. In 1788–89 the frost lasted for 49 days; in 1794–95 for 52 days; in 1838 for 50 days; and in 1890–91 for 59 days.

TEMPERATURE AT ORENBURG.—Mr. Müller Matt, professor at the Lyceum of Tashkent, writes to the Paris Geographical Society, (*Compte Rendu*, N° 1, 1891), enclosing an extract from the Moscow *Viedomosti*, to this effect:

"Orenburg, Nov. 19. We have the most extraordinary weather, unlike anything hitherto known, and characterized by the most violent changes of temperature. We had a copious rain, with the thermometer at 37°.4 (Fahr.), and in *twenty minutes* the mercury fell to —22° (Fahr.). A party of 30 Kirghis on the way to Orenburg was overtaken by the rain, followed by the bitter cold, and the men froze on their horses. Ten of these men have been brought in, and we are now seeking for the others. Many horses and cattle have perished, and it is feared that every living creature on a train bound for this place may have been frozen.

"*P. S.*—Just now the weather is mild, and we had only had before this a few good frosts ; I hope, therefore, that M. E. Blanc has been able to make his way to Kashgar."

Orenburg is situated in 51° 48′ N. Lat., 55° 12′ E Long.

A VISIT TO ETNA.—M. Emile Chaix tells in a little pamphlet,* the story of an excursion made in July and August, 1890, to Italy and Sicily.

He is partly of Théophile Gautier's opinion, that the lands of the sun should be seen in the summer ; and he sketches with a firm touch the characteristic landscapes through which he passes on his way to Catania.

The smiling aspect of Etna, green from base to summit, disappointed him ; but he began to know the mountain better when he saw at Nicolosi the black mass of the lava-flood that buried a wide region in 1886. From Nicolosi a path leads up the mountain, directly towards the north, to the Casa de' Cervi, which stands close to Monte Gemellaro, the crater formed in 1886. For a half hour the ascent was made between walls constructed of fragments of lava, which reflected the burning heat of the sun. The path then lay across a bed of lava, 250 years old, with a few tufts of grass and shrubs growing here and there, and covered more and more thickly, as the ascent continued, with a fine *coke*, which spreads around the Casa de' Cervi like an immense desert of black dust, out of which rises, on each side of the house, a small clump of chestnuts. Monte

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*Une Course à l'Etna, par Emile Chaix. Genève, 1890. The illustrations are from Mr. Chaix's photographs.

Gemellaro, which made its appearance in 1886 and threw out all this black dust, is a truncated cone, about five hundred feet in height, and composed of scoriæ, exactly like coke. The crater still emits sulphurous vapors and is lined with deposits, red, yellow and white; but the most magnificent coloring is seen in a *solfatara*, on the outer southern side of the cone. An explosion has laid bare a vertical wall above a mysterious cleft, and from this cleft issue various gases which have covered the wall with yellow, white, orange, red and violet incrustations, of extraordinary brilliancy, heightened by the ebony blackness of their setting.

The lava issued from a line of *bocche* (literally, *mouths*). Near this line a sinking, in the direction of the lava-stream, has left a ravine three-fifths of a mile in length, with a width of from 100 to 160 feet, and a depth, varying from 12 to 40 feet. Its sides are vertical, or overhanging, and show alternate layers of compact lava and black scoriæ.

From this alternate arrangement it appears that the streams of lava flow out one after another and pass one above the other, each successive flow covering the scoriæ, or a part of the scoriæ, borne on the surface of the preceding flow; and while the layers of scoriæ that separate the lower strata of lava attain a thickness of not more than from eight to twenty inches, there are enormous heaps of loosely piled masses of coke, forming true moraines at the sides and extremities of the lava streams.

Nothing is more unlike a smooth floor than the surface of the lava.

It is formed of irregular clusters of brown or black scoriæ of every possible size, and in every stage of cohesion, and split in all directions. Even with the stoutest shoes to defend the feet and an alpenstock in hand, the march over such a surface is full of dangers. The shoes are cut by the sharp points of the lava; or a mass that seemed to be solid gives way under the foot; or the end of the alpenstock, planted to maintain the equilibrium, is driven through a softer crust, and its owner falls on the jagged surface, or into a deep fissure.

PRINCIPAL SOURCE OF THE LAVA STREAM (1886),
NEAR THE FOOT OF MONTE GEMELLARO.

To the north of the Casa de' Cervi is the Casa del Vescovo, one of the spots at which snow is collected to supply the demand for the city of Catania. The snow-drifts in the ravines are covered by the proprietors with seven or eight inches of volcanic sand, and this suffices to preserve the mass for several successive summers. The snow is cut out as wanted, in blocks of about 200 pounds. Each block is put in a bag, with a few dry leaves at the bottom, and covered at the mouth with ferns ; and there is almost no loss of weight by melting. The cost of the bag of snow to the carrier is one franc. Two bags are a load for a mule, and they bring five francs at Nicolosi.

THE SURFACE OF A RECENT CURRENT OF LAVA—OF 1886.

Mr. Chaix climbed beyond the Casa del Vescovo to the crest of the Serra del Solfizio, (in the Valle del Bove) from which point he enjoyed a view that took in the Valle del Bove, with steep walls of rock, 4,000 feet long, below and in front of him, the great cone of Etna on the left, and on the right the coast-line and the sea, and beyond, Calabria and the infinite horizon.

The view from the summit (10,870 feet above the sea, according to the latest measurement) is hardly to be matched.*

The crater of Etna has a circumference of a mile and a quarter, and a depth of from six to eight hundred feet, with almost vertical sides, covered with sulphur-yellow deposits from the gases constantly emitted. Nothing can be more desolate than the aspect of the mountain-top. It is a heap of lava and scoriæ and ashes, which the snow has changed into tufa, and is channelled by the rain, especially on the eastern side. On the other sides the black lava predominates, and everywhere the ground is covered with loose fragments in the form of pebbles, which slip and roll under the feet.

On the eastern side of the volcano lies the Valle del Bove, a great ravine, or valley, which extends from the base of the cone half way down the mountain.

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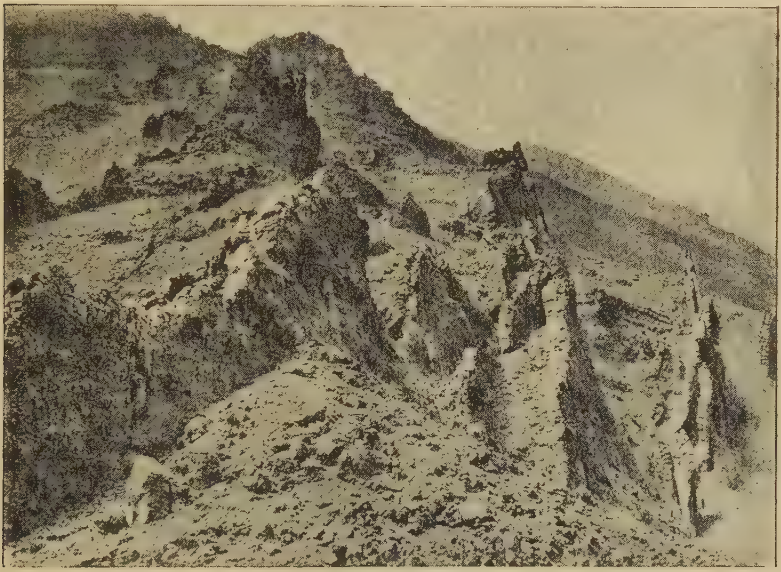
* The panorama is described by Dr. Weigand, who made the ascent not long before Mr. Chaix :

"The moon and the stars faded, and the coming of the sun was announced by the deepening red of the eastern sky. We saw below us, as on a map, the Ionian Sea, the peninsula of Calabria, and the Gulf of Taranto, and near at hand the Strait of Messina ; to the north the dark mass of the Faro Mountains looked like a chain of low hills, and in the Tyrrhenian Sea rose up a great cloud of smoke and vapor, through which we made out the form of the unresting Vulcano, in the Lipari Islands. Beyond, the north coast of Sicily stretched to the western horizon, and the eye rested on Monte Pellegrino, the mountain from which, near Palermo, we had caught our first glimpse of Etna. The line of the southern coast was clearly seen, and the whole island, with its white-shining cities and villages, nowhere broken by breadths of forest, lay in the golden-red sunlight, and projected on this in strong contrast was the deep blue of the perfectly-formed, triangular shadow cast by the mountain on the country at its base."

XII Jahresbericht des Vereins für Erdkunde zu Metz für 1889–90.

This valley, which is shaped like a horse-shoe, is nearly six miles long, with a breadth of two and a half miles at the lower, and nearly four miles at the upper end. It is open towards the E. S. E., and sinks gradually in that direction from a height of nearly 10,000 feet to less than 2,000; and farther down the rampart disappears under the beds of lava and tufa that slope to the sea.



VALLE DEL BOVE.

DENUDED ANCIENT ERUPTIVE VEINS, FROM 3 TO 15 FT. THICK, OF PHONOLITE, PYROXENITE, DOLERITE AND BASALT.

Mr. Chaix explains the origin of the valley in these words:

"It is probable that the valley is the result of the combined action of eruption and erosion, the former having been much the more important force. The layers of lava and scoriæ which form the southern and northern outer slopes of the valley have a very regular inclination (some 30°), like that of a pyramid with its apex high above the centre of the actual valley. The Monte Calanna, Rocca Musarra, etc., which close, on the east, the central lava plain of the valley, before the lava cataract begins, are formed of the same materials, with the same relative position towards the valley. This is also the case with the lower layers on the western side, the upper ones having a direction towards the present central cone. This formation precludes the idea of *mere explosive* and *mere erosive* action, because had there been such action, the primitive layers would occupy their primitive position, with a general gentle slope towards the east. The contrary is the case. Their composition and inclination are exactly those of eruptive cones formed, like the cone of Vesuvius, of layers of lava and pumice, deposited over one another through long periods, and with one common centre; only, in the Valle del Bove, the layers are denuded of all the loose materials which compose the edge or upper wall of an active crater. Regarding the destruction of the eastern brim of the Cratere del Bove, it must have been caused by the exit of lava through the base of the unconsolidated brim. The flow of lava in such cases, which often occur, bears away on its surface all the superincumbent material and leaves a wide breach in the enclosing wall. A striking example of this action is seen in the Monte Nero Settentrionale (southwest of Linguaglossa), which is open on the north side down to the level of the lava stream, which flowed from it in 1646. The eastern wall of the Cratere del Bove would have yielded more easily to such a flow, because it was probably weaker than the others, as the general lowering of the layers on that side seems to indicate. It is not necessary to suppose that volcanic action ceased in the Cratere del Bove immediately after the breach in the eastern wall. The regular little ridge (now overflowed with lava), which extends across the valley between Rocca Palembe and Musarra, Monte Calanna and Zoccolaro, and from which flowed the lower cataract of lava, may very well be a new wall formed by later eruptions, in the place of the one which had been borne down. When volcanic action had ceased in the Cratere, it must have presented, as all extinct craters do, the aspect of a large circular funnel. Erosion began to fill it up with the loose materials of the sides, laying bare, in this way, all earlier eruptive veins; and the process was helped by eruptions of the new more westerly cone, from which descended streams of lava, that filled the pit to the level of the little eastern brim and then passed over it. The most ancient stream visible from under the more recent ones dates from 1284; but older streams, now invisible, may exist below the unbroken crust of the newer lava. There is, about half a mile to the eastward of the Casa Etnea, a little crater which is now filling up in the way described. It is already changed into a little plain, by the inflow of lava from the central cone. Let this flow continue, and the brim will be covered, and then we shall find a plain of lava ending on the eastern side in a downpour, inclined at an angle of nearly 30°; an exact reproduction of what is seen at the eastern end of the Valle del Bove."

The bed of the valley is formed of three successive, nearly horizontal strata, each about 1,600 feet thick, and composed entirely of lava, and more particularly, of lava from the eruptions of 1792, 1802, 1811, 1819, 1838, 1842, 1852 and 1869; but below these currents there are others, much more ancient; the valley, originally far deeper than it is at present, having been gradually filled from age to age. The sides are rocky crests, separated by beds of detritus, and formed of alternate layers of lava and tufa, cut into by erosion and crossed in every direction by great vertical walls of hard rock with a crackled surface (green pyroxenite, phonolite, etc.).

The Valle del Bove is what remains to us of the primitive biography of Etna. The eruptive cone changed its place, from one period to another, and each eruption made its contribution to the accumulation of lava, ashes and scoriæ, which forms the body of the volcano. The history of to-day shows the past history. With every eruption fissures run from the great cone like so many converging lines. These fissures are soon filled with liquid lava below and with the scoriæ on top, and in process of time the work of erosion removes the lighter materials and leaves the hard lava ridges.

Mr. Chaix found the Valle inhabited by shepherds, whose honesty and simplicity filled him with admiration. They lived in a circular dwelling constructed of stones, with a roof made of broom, and supported in the centre by a wooden pillar. Near the dwelling was the larder, made of twigs and branches and supported on four posts about seven feet high, to keep the provisions beyond the reach of the dogs; and beyond this were three or four enclosures, built of large stones, for the sheep.

The higher region of the northern side is the most interesting portion of Etna, so far as modern volcanic phenomena are concerned. The base of the great cone is still cracked and shows a range of active vents, with a stream of lava a mile and a quarter in length. Here also is Baron Waltershausen's prehistoric "elliptical crater," of two and a half miles in diameters; and the innumerable craters and vents, the crevasses, the labyrinths of rivers and cataracts of lava, leave an ineffaceable impression of grandeur and destructive energy.

TIME-RECKONING IN THE PHILIPPINES.—Capt. Jerolim von Benko, of the Austro-Hungarian Navy, has brought out in separate form, under the title, *Das Datum auf den Philippinen*, a paper contributed by him to the work, *Die Schiffsstation der k. u. k. Kriegs-Marine in Ost-asien*, of which it forms the thirty-second chapter.

The subject is the change of time-reckoning in the Philippine Islands, and to introduce it Captain von Benko states some elementary principles. For all places situated on the same meridian midday occurs at the same instant. Midday comes earlier for places to the east of a given meridian, and later for places to the west of it, each degree of longitude being equivalent to a difference of four minutes of time. For instance: if it is 8 o'clock A. M. on the first of January, at Vienna, what is the hour of the day at the antipodes, 180° from Vienna? Calculating the meridians toward the east the hour will be 8 P. M., on the first of January; but calculating toward the west the answer will be 8 P. M., on the thirty-first of December. Whatever prime meridian be adopted, there will be a difference of a day in the time-reckoning of the hemispheres divided by the anti-meridian.

The Philippine Islands belong to the hemisphere which includes Europe, but up to the year 1845 the Philippine calendar was one day behind that of the Eastern hemisphere. This difference dated from the year 1571, when Legaspi, coming from Spanish America, took possession of the Islands and founded the colony; and it was unobserved for more than two centuries, because the communication between the Philippine Islands and Europe was maintained through the port of Acapulco. This communication was cut off by the independence of Mexico, and the progressive development of Oriental commerce by way of the Cape of Good Hope made the double date more and more of a burden; and on the 16th of August, 1844, the Captain-General Claveria issued, in concert with the Archbishop of Manila, a decree which suppressed Tuesday, December 31, 1844, and declared the day following Monday, December 30, to be Wednesday, the 1st January, 1845.

Captain von Benko has called attention to this history, because he finds that, not only are the encyclopædias in error on the point, but even such geographers as Oscar Peschel and Rudolf Falb refer to the Philippine peculiarity of date as if it were still in existence.

Even the scientific men of the great *Novara* Expedition, though they explained the change of date at the crossing of the 180th meridian, failed to mention, in their account of the ship's visit to Manila in 1859, the correction of time-reckoning in the Islands.

Capt. von Benko rightly holds that error, supported by such authorities, must be openly refuted; and he prints at the end of his pamphlet, the certified text of the Captain-General's decree, as follows:

SUPERIOR GOBIERNO DE FILIPINAS.

EXMO. É ILMO. SOR.:

Con esta fecha he decretado lo que sigue.

Considerando conveniente el que sea uniforme el modo de contar los dias en estas Islas á Europa, China, y demas paises situados al Este del Cabo de Buena Esperanza, que cuentan un dia mas por razones que á todos son bien conocidas, vengo en disponer con acuerdo del Exmo. é Ilmo. Sor. Arzobispo, que por este año, solamente, se suprima el Martes 31 de Diciembre, como si realmente hubiese pasado, y que el siguiente dia al Lunes 30 del mismo se cuente Miercoles 1° de Enero de 1845, que es con el que empezará el Calendario de dicho año en el cual ninguna alteracion se necesita hacer.

Y lo comunico á V. E. I. para su conocimiento y efectos consiguientes. Dios gue á V. E. I. m. a.

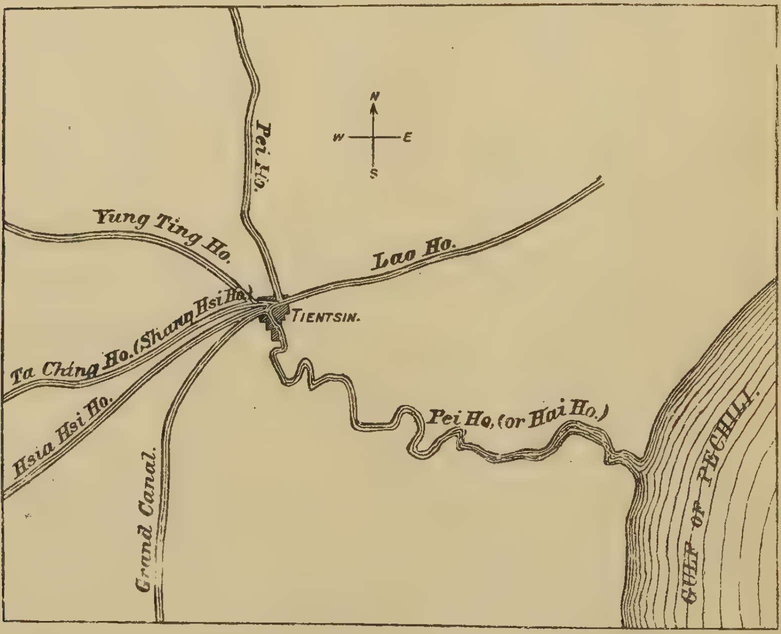
NARCISO CLAVÉRIA.

Manila, 16 de Agosto de 1844.
Exmo. é Ilmo. Sor. Arzobispo deesta Diócesis.

THE FLOODS IN NORTH CHINA.—No. 122, of the *Reports from the Consuls of the United States*, contains an account of the floods around Tien-Tsin in July, 1890. With his report Consul Bowman sends the accompanying sketch of the river-courses in the neighborhood of the city.

The rains began July 7, about the usual time for the opening of the rainy season. There fell that day 5.54 inches; and on the six days, from the 16th to the 21st, 22 inches; the average rainfall for the year at San Francisco. A quantity of water equal to the year's supply fell in less than a month.

By the 20th of July it was seen that a catastrophe was at hand, and the next day the river banks gave way on the eastern and western sides. On the East the plain was covered with water as far as the eye could reach, while on the western side part of the French concession was inundated and many Chinese houses were swept away. These breaks did not relieve the pressure, for they were both below the junction of the rivers. On the 22d the levees of the Grand Canal, at about 7 miles from Tien-Tsin, broke, and this saved the city from destruction. "At present," (Sept. 4, 1890), says Mr. Bowman, "the foreign settlement and the native city of Tien-Tsin are like an island in the midst of the waters. The suffering of the villagers is extreme; their crops and in many cases their houses are entirely destroyed."



The Relief Committee, after exploring in all directions, reported in August, that all the country, as far as the sea to the east, and for a distance of from 40 to 60 and 100 miles to the west, north and south, was under water, 8 feet in depth in some places. There were at one time 30,000 refugees, mostly women and children, in Tien-Tsin.

There is a central organization, called the Ch'ou Chen Chü, through which official assistance is distributed. This Committee collects information and receives reports from the outlying districts ; and private charitable institutions, by co-operating with this central office, are enabled to know in what quarter their assistance may best be bestowed. Relief is given, first, to children and old men, next to women, and last to able-bodied men; and no attempt is ever made to exact any work from those relieved. It is felt that when a calamity occurs, over which the people have no control, it is their right to be fed by the authorities.

THE POLITICAL PARTITION OF AFRICA.—Under this title Mr. J. Du Fief describes, in a recent *Bulletin* of the Belgian Geographical Society, the African territories held or claimed, whether as colonies or as *spheres of influence*, by the European Powers. These Powers are : Belgium, England, France, Germany, Italy, Portugal, Spain and Turkey.

Belgium claims the Congo Free State, which is bounded by the French territory along the Congo and Ubangi rivers, the Portuguese territory of Angola, the English territory on the Zambezi and Lake Nyassa, the German territory along Lake Tanganyika, and the English territory on the Upper Nile.

ENGLAND possesses : in *West Africa*, Gambia, Sierra Leone, the Gold Coast, and Ashanti ; the Delta and the middle course of the Niger, as far as Say, the river Benue to Yola, Sokoto and Bornu up to Lake Tchad ; and in the Atlantic the islands of Ascension and St. Helena ; *in South and Central Africa,* Cape Colony, Natal, Pondoland, Basutoland, Zululand, Griqualand, Bechuana, a portion of the Kalahari Desert, the territories of the Bamangwato and the Matebele, and the region comprised between the Cabompo and the Zambezi rivers, the rivers Savi, Mazoe and Ruo, and Lakes Nyassa, Bangweolo, Moero and the southern end of Tanganyika ; *in East Africa and the Nile Basin,* the Protectorate of Zanzibar, the coast from the Wanga River to the Juba and the interior country, with half of the Victoria Nyanza, Uganda, and the region of the Upper Nile as far as Abyssinia, and a preponderating influence in Egypt ; *and in the Indian Ocean,* the Seychelles and Amirantes, Mauritius and Socotora.

France possesses : in *North Africa,* Algeria and the Protectorate of Tunisia, with a sphere of influence to the south across the Sahara as far as the Niger and Lake Tchad ; in *West Africa,* Senegambia and the basin of the Upper Niger, Grand Bassam and Assinia on the Gold Coast, Great Popo and Porto Novo, the territory of the Gabun and that of the Ogowe, or French Congo, lying between the Atlantic, the Portuguese territory of Cabinda, the river Congo above Manyanga, and the Ubangi River ; and in *East Africa,* Madagascar (Protectorate), the islands of Sainte-Marie, Réunion, Mayotte, Nossi-Bé and the Comoro group, and the district of Obock, on the Gulf of Aden.

Germany possesses : in *West Africa,* Togoland, on the Slave Coast, with Porto Seguro and Little Popo, and the Kamerun, lying between the Rio-del-Rey and the

Campo River, with a possible extension inland to Lake Tchad; in *South Africa*, Damaraland and Great Namaqualand, from the Cunene River to the Orange, with the interior as far as the 20th and 21st degrees of longitude, E. of Greenwich, and access to the Zambezi River, and in *East Africa*, the region along the Zanzibar coast from the Rovuma River to the Wanga, and the interior country as far as Lakes Nyassa, Tanganyika, and Victoria.

ITALY possesses: in *East Africa*, the zone along the shore of the Red Sea, from 18 degrees N. latitude to Raheita on the Strait of Bab-el-Mandeb, comprising in actual possession Massaua, and its environs, with Keren, Asmaro, and the islands of Dahlak, Assab, Bailul and Gubbi, and the rest under Protectorate, with Abyssinia in the sphere of influence; and the coast of Somaliland from the river Juba on the south to 10° N. latitude, with a sphere of influence to the interior as far as Shoa and Harar.

PORTUGAL possesses: in *West Africa*, the Azores, Madeira and Cape Verde Islands, some establishments on the coast of Senegambia (Cacheo, Bissao, Bolama, etc.), the islands of S. Thomé and Principe, the region of Cabinda, the Congo district and the province of Angola (including Loanda, Benguela and Mossamedes), and the interior as far as the Kwango or Cabompo and the Zambezi; and in *East Africa*, the province of Mozambique from Cape Delgado to the parallel of 26° 35′ S. latitude, and bounded by Swaziland, the South African Republic, the rivers Savi and Mazoe, the Zambezi from Zumbo to the rapids of Caroa Bassa, the Ruo River (which flows into the Shire) Lake Nyassa and the Rovuma River.

SPAIN possesses: in *North Africa*, Ceuta and Melilla, the Zaffarin islands, etc.; and in *West Africa*, the Canary islands, the Coast of the Sahara from Cape Bojador to Cape Blanco, and the Adrar, the Bay of Corisco (in the Bight of Biafra), and the islands of Fernando Po and Annobon.

TURKEY possesses: the Province of Tripoli, and the suzerainty of Egypt.

The portions of Africa not yet subjected to foreign domination are: in *North Africa*, Morocco; in *West Africa*, the Republic of Liberia and Dahomey; in *South Africa*, the Orange Free State, the South African Republic, and Swaziland; in the *Nile Region*, Nubia and Kordofan; and in the *Interior of the Continent*, the Lybian Desert, to the S. of Barca, the country of the Tibbus, south of Fezzan, and Bagirmi, Waday and Darfur, in the Sudan.

M. Du Fief's paper presents also a chronological view of European occupation in Africa from the 15th Century to the year 1890, the history of the Congo Free State, the agreements (23 in number) between the occupying Powers, and the principal articles adopted for securing the freedom of commerce and the abolition of the slave trade.

Mr. E. G. Ravenstein gives, in *The Development of Africa*, by A. Silva White, the following estimates of the area and population of African countries:

	Sq. M.	Population.
Belgian Africa	827,000	15,000,000
British "	2,351,936	39,289,500
French "	2,783,948	21,947,600
German "	832,750	5,105,000
Italian "	315,070	5,369,000

			Sq. M.	Population.
Portuguese Africa			909,820	5,513,900
Spanish "			246,760	444,000
Turkish: "			836,000	7,980,000
Egypt	436,000 sq. m.	6,970,000 pop.		
Tripoli	400,000 sq. m.	1,010,000 pop.		
Independent Africa:			2,411,023	26,389,370
Liberia	37,000 sq. m.	1,050,000 pop.		
Boer States	173,350 sq. m.	744,000 pop.		
Native States	2,120,323 sq. m.	24,595,370 pop.		
Great Lakes	80,350 sq. m.			
All Africa			11,514,307	127,038,370

Myvyrian Archaiology: The Voyages of the Welsh to America. By B. F. De Costa.

Albany, 1891.

Under the name of Owen Jones's famous book, Dr. De Costa puts forth the testimonies as to the historical character of Madoc's Voyage. These testimonies cover, as he says, six important points:

1. That there was a well-known historic person named Madoc, the son of Gwynedd, Prince of Wales.
2. That he was a sailor, whose natural disposition drew him to adventures on the sea.
3. That this Madoc made westward voyages upon the Atlantic.
4. That after the first voyage, upon which he embarked more or less secretly, he was supposed to have been murdered, while, on trial, the accused man was cleared.
5. That he reappeared in Wales, raised a company of three hundred men and women, embarking the company in ten ships, with the intention of returning to the site of his colony.

6. That he sailed westward for the purpose of founding a colony and never returned.

These statements antedate the voyage of Columbus, and come down from a period when the Welsh were indifferent to discoveries on the Atlantic.

It is true, as Dr. De Costa admits, that neither Giraldus Cambrensis, nor Guttyn Owain, mentions the Voyage. The positive testimony is still sufficient to justify the conclusion that the subject is worthy of study, and beyond this Dr. De Costa, who is a scholar and a prudent man, declines to go.

Applied Geography: A Preliminary Sketch. With Eleven Maps and Diagrams. By J. Scott Keltie.
London, 1890.

Mr. Keltie proposes "to show what are some of the bearings of geographical knowledge on human interests; on the course of history, but more especially on industry, commerce and colonization."

The book is, he adds, a series of suggestions and examples, which may be of use to teachers, and may have some interest for intelligent readers generally.

Mr. Keltie's name gives assurance of good work, and this little book will help many who think they have passed on into the narrower circle of special readers.

Americans, given to what is known as "spread-eagle-ism," may see their own fault as in a magnifying mirror in the description of the British Empire at pp. 91–92, and enjoy, perhaps the unconscious humor of the following passage:

"From our standpoint as subjects of the Queen, we might divide the world into two parts; ourselves on one side and the rest of world on the other—the British Empire and Foreign Countries."

The maps and diagrams by Mr. E. G. Ravenstein admirably illustrate the text.

In and Out of Central America and Other Sketches and Studies of Travel. By Frank Vincent. With Maps and Illustrations. New York, 1890.

Mr. Vincent is an entertaining traveller, who sees for himself and honestly believes what he writes, even if he does not always see things in the true light.

The fondness for travel he shares with many of his countrymen, but he is one of the few who take the pains to publish their observations.

About half the present volume is devoted to Central America and the aspects of life in its principal towns and along the routes of travel.

The other sketches are "A Rival to Solomon's Temple" (the Cambodian ruins), "Quarantined in the Antilles," "An Oriental Monster" (Theebau), "An Exiled Emperor" and "White Elephants."

OBITUARY.

M. Jean-Baptiste-Joseph Liagre, ex-President and Honorary President of the Belgian Geographical Society, of Brussels, died in that city January 12, 1891, at the age of 76 years.

One of the Founders of the Society and always devoted to its interests, M. Liagre enjoyed the affection and respect of all men for his just and kindly character, no less than for his high intelligence and the wide range of his acquirements.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

BERLIN.—*Gesellschaft für Erdkunde, Verhandlungen.*

Travels in the Cordillera of the Argentine Republic (Dr. Brackebusch)—On Northern German-Africa (Dr. Baumann).

Zeitschrift.

Report of a Journey through Northern and Middle Greece (Dr. Philippson).

EDINBURGH.—*The Scottish Geographical Magazine.*

Anniversary Address. Rivers, Plains, and Mountains. (By E. G. Ravenstein)—Our Commercial Relations with China (Prof. R. K. Douglas)—Examination Scheme of the Royal Scottish Geographical Society—A Journey to Tashkent—The Physical Conditions of Central Asia in Relation to Russian Colonization (Lieut.-Gen. Annenkoff)—On the Scientific Results of Dr. Nansen's Expedition (Prof. Geikie)—Obituary : 1890.

GOTHA.—*Petermanns Mitteilungen.*

Hermann Berghaus (by Dr. H. Wagner)—From the Albert Nyanza to the Victoria Nyanza, 1886 (Dr. W. Junker)—The German Solomon Islands, Buka and Bougainville (H. Zöller)—The State of S. Paulo, Brazil (Dr. H. Lange)—Deep-Sea Explorations in the Black Sea, 1890 (Dr. A. Woeikoff)—The Water-shed of the Baltic Flats.

LONDON.—*Royal Geographical Society, Proceedings.*

On Matabele and Mashona Lands—The Tashkent Exhibition, 1890—Lands of the Globe still Available for European Settlement (E. G.

Ravenstein) — Explorations in Alaska and North-west British Columbia—Notes on the Country lying between Lakes Nyassa and Tanganyika — The Russian Expedition to Central Asia under Colonel Pevtsoff.

MADRID.—*Sociedad Geográfica de Madrid, Boletin.*

El Ksar-el-Acabir (Teodoro de Cuevas)—Portugal and England in South Africa (Rafael Torres-Campos)—Report on the Work and the Condition of the Society—Memoir on the Progress of Geography (Martin Ferreiro)—The Providence Islands (Arrecifes) in the Caroline Archipelago—Gibraltar.

PARIS—*Société de Géographie, Compte Rendu.*

M. Müller Matt: Letter on the Temperature of Orenburg and on the Crickets in the Caucasus —M. Ed. Blanc in Central Asia—Chung-King, a new Chinese Port—Exploration in Laos—Navigability of the Me-Nam-Khong—The Trans-Saharan Railway—The Catholic Mission of Kilimanjaro—Dr. Catat in Madagascar—Dahomey and Porto Novo—M. Jules Garnier in North America.

Bulletin.

The Territory in Dispute between France and Brazil—The Kingdom of Assinia (Senegal)—From Zanzibar to the Station of Kondoa (50 miles S. E. of Mpwapwa)—A Note on Tobruk (Coast of Barca)—Studies in Historical Geography on the Ancient Routes across the Pamír—Travels in Central Asia and on the Pamír (Bonvalot)—The Pamír and the Chitral

(Valley on the road from India to Turkestan)—Paul Crampel's Journey in the Northern French Congo.

ROME.—*Società Geografica Italiana, Bollettino.*

Honors Paid to Antonio Raimondi—Hermann Berghaus—On the Lack of Italian Cartographers, and Some Gaps to be filled in the Course of Instruction—Letters from Entotto; one of King Menelek, the other of Dr. Traversi—Recollections of a Sojourn in the Harar—Bricchetti-Robecchi's Botanical Collections from Somaliland—The Initial Meridian and the Universal Hour—The Observatories of Etna and Catania.

WASHINGTON LETTER.

WASHINGTON, MARCH 15, 1891.

GEOGRAPHICAL RESULTS OF THE CENSUS.—Mr. Henry Gannett, in charge of the geographical work of the eleventh census, says* that the areas of the States and Territories are identical with those published by the tenth census excepting as they have been modified by the following territorial changes:

(1) The formation of the Territory of Oklahoma.

(2) The division of Dakota into North and South Dakota.

(3) The transfer of a small part of South Dakota to Nebraska.

The gross area is 3,025,600 square miles, of which 2,970,000 is land surface and 55,600 water surface. The areas of the counties have been thoroughly examined and revised.

According to the same authority† the mean annual temperature of the United States, excluding Alaska, is 53°. The greatest density of population naturally centres on this pivot, ranging from 50° to 55°. From this, as a maximum, the density of population rapidly diminishes with the increase or decrease of temperature. The most rapid proportional increase has taken place at the two extremes, where it has trebled between 1870 and 1890, while in the same time it has increased but about 50 per cent. in the most densely settled group.

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* Census Bulletin No. 23.

† Census Bulletin No. 33.

The influence of rainfall[*] is shown in the fact that the main body of the population inhabits the region in which the annual rainfall is between 30 and 50 inches, three-fourths of the inhabitants, or thereabouts, being found there. On either side, as the rainfall increases or diminishes, the population diminishes rapidly. The arid region of the West, where the rainfall is less than 20 inches—a region which comprises two-fifths of the entire area of the country—contains at present less than 3 per cent. of the population. The most rapid *increase*, however, has been where the rainfall ranges from 20 to 30 inches; that is, in the eastern portion of the great plains ranging from Texas to Dakota, where the density has increased in twenty years from 1.6 to 8.1.

Mr. Gannett further says,[†] that the centre of population in 1890 was in the following position:

Latitude	39° 11′ 36″
Longitude	85° 32′ 53″

It rests in southern Indiana, at a point a little west of south of Greensburg, and twenty miles east of Columbus, Indiana. To those who have not access to the *Bulletin* referred to the following extracts will be interesting:

In 1790 the centre of population was at 39° 16.5′ N. lat. and 76° 11.2′ W. long. or, about twenty-three miles east of Baltimore. Between 1790 and 1800 it moved almost due west to a point about eighteen miles west of the same city, being in lat. 39° 16.1′ and long. 76° 56.5′. From 1800 to 1810 it moved westwardly and slightly southward to a point about forty miles north-west by west from Washington, being in lat. 39° 11.5′ and long. 77° 37.2′. From 1810 to 1820 it moved westward and again, slightly southward to a point sixteen miles north of Woodstock, Va., being in lat. 39° 5.7′ and long. 78° 33′. From 1820 to 1830 it moved still further westward and southward to a point about nineteen miles south-west of Moorefield, W. Va., being in lat. 38° 57.9′ and long. 90° 16.9′. From 1830 to 1840 it moved still further westward, but slightly changed its direction northward, reaching a point sixteen miles south of Clarksburg, W. Va., being in lat. 39° 2′ and long 80° 18′. From 1840 to 1850 it moved westward and slightly southward again, reaching a point about twenty-three milet south-east of Parkersburg, W. Va., in lat. 38° 59′ and long. 81° 19′. From 1850 to 1860 it moved westward and slightly northward reaching a point twenty miles south of Chillicothe, Ohio, in lat. 39° 0.4′, long. 82° 48.8′. From 1860 to 1870 it moved westward and sharply northward, reaching a point about forty-eight miles east by north of Cincinnati, Ohio, in lat. 39° 12′, long. 83° 35.7′. In 1880 the centre of population had returned southward to nearly the same latitude which it had in 1860, being lat. 39° 4.1′, long. 84° 39.7′. During the past decade it moved northward into practically the same latitude which it occupied in 1870, its present position being as already stated lat. 39° 11′ 56″, long. 85° 32′ 53″.

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[*] Census Bulletin, No. 32.

[†] Census Bulletin, No 34.

The closeness with which the centre has clung to the parallel of 39° cannot fail to be noticed. The most northern point reached was in 1790, the most southern in 1830. The extreme variation in latitude has been less than 19 minutes, while the movement in longitude has been nearly 9.5 degrees, or a total westward movement of 505 miles.

The movement by miles is shown in the following table:

1790.	23 miles east of Baltimore, Md.	
1800.	18 miles west of Baltimore, Md.	41 miles.
1810.	40 miles north-west by west of Washington, D. C.	36 "
1820.	16 miles north of Woodstock, Va.	50 "
1830.	19 miles west-southwest of Moorefield, W. Va.	39 "
1840.	16 miles south of Clarksburg, W. Va.	55 "
1850.	23 miles south-east of Parkersburg, W. Va.	55 "
1860.	20 miles south of Chillicothe, Ohio	81 "
1870.	48 miles east by north of Cincinnati, Ohio	42 "
1880.	8 miles west by south of Cincinnati, Ohio	58 "
1890.	20 miles east of Columbus, Ind.	48 "

The centre of the area of the United States, excluding Alaska, is in northern Kansas, in approximate latitude 39° 55′ and approximate longitude 98° 50′. The centre of population is, therefore, about three-fourths of a degree south and more than seventeen degrees east of the centre of area.

UNITED STATES BOARD ON GEOGRAPHIC NAMES.—At the request of the Census office the Board has prepared a list of the names of counties in every State and Territory of the United States, officially corrected. The spelling in the census reports will conform to that adopted by the Board, and will also be adopted by the Post Office Department and all other branches of the Government. Subsequent editions of the Postal Guide will be corrected to correspond. This, the second Bulletin, will probably be issued the latter part of the present month.

HYDROGRAPHIC GEOGRAPHY.—Ensign James C. Drake, U. S. N., in his report on *The sounds and estuaries of*

Georgia with reference to oyster culture[*] describes the length, width, course, and (with great minuteness) the depth of ninety-nine streams and sounds along the coast of the State included between latitude 32° 03′ and 30° 43′ north. Ensign Drake was an assistant to Lieut. Winslow, who for three years was engaged in a similar work on the coast of North Carolina. Seven charts accompany the report.

Mr. Tarleton H. Bean[†] in treating of the physical characteristics of the environment of the salmon, describes with particularity, several bays, rivers and lakes of the Kadiak group of islands, Alaska. Several original topographical and reconnoissance maps of the region accompany the report.

In the central region of the Atlantic Ocean, in the neighborhood of the Madeira and the Canaries, recent bathymetric surveys have developed three unsuspected peaks rising abruptly out of the ocean, which here sinks to a depth of more than 2,000 fathoms. These, named Dacia Bank, Seine Bank, and the Salvages, together with Enderbury Island in the central part of the South Pacific Ocean, and the un-named shoal within late years developed by the U. S. ships *Tuscarora* and *Ranger*, in the ocean to the westward of San Francisco, are taken as the basis of "An inquiry (by G. W. Littlehales, of the U. S. Hydrographic Office) into the average form of isolated submarine peaks, and the interval which should obtain between soundings taken to disclose the character of the bottom of the ocean."[‡]

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[*] U. S. Coast and Geodetic Survey: Bulletin No. 19.

[†] Salmon and salmon fisheries of Alaska, 1890.

[‡] Hy. Office Pub. No. 95, 1890.

The author says: "This inquiry is undertaken with a view of fixing the ideas of navigators as to the proper interval between deep sea soundings taken to develop the existence of important changes in the bed of the ocean, and also with a view of affording some means of making comparisons between the slopes of land and submarine peaks by deducing the equation to the curve which, by revolution around a vertical axis, would generate the average of the surfaces of the submarine peaks above mentioned."

The deep sea soundings which have been observed in each of these localities are shown on charts.

In twelve sketches * Mr. Henry L. Marindin of the U. S. Coast and Geodetic Survey demonstrates graphically the movements of the tide in filling and draining the tidal reservoirs surrounding New York City. In the text accompanying he says: "If they were no more valuable than in aiding the study of the question of the respective values of the bays and flats as tidal reservoirs in maintaining the channel ways through Sandy Hook bar, they would then have repaid the time and labor spent in preparing them."

Bureau of American Republics.—This Bureau, of which Mr. W. E. Curtis is the director, is steadily engaged in gathering information that may be useful to producers, merchants, manufacturers and others interested in the development of commerce between the countries of the Western hemisphere. It should not be forgotten that the Bureau is available as a medium of communication for persons desiring reasonable infor-

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* U. S. Coast and Geodetic Survey: Appendix No. 9, Report for 1888. Washington, 1890.

mation in regard to the customs, tariffs and regulations, and the commerce and navigation of the American republics.

The *Hand Book of the American Republics* is the title given to the first Bulletin of the Bureau, recently issued, and dated January, 1891. It is an attractive volume of 288 pages, well printed on good paper, with nine illustrations, four of which are maps. It has a geographical chapter, and one containing historical notes. The others relate to the commercial and economic features of Latin America. There will also be a series of bulletins devoted to descriptions of each of the American republics, their resources, industries, commercial advantages, customs, laws, and regulations. Also a code of nomenclature containing a list of all articles of merchandise imported and exported, with their Spanish and Portuguese equivalents. Mr. Curtis will appreciate any suggestions that may be offered for increasing the value of the bulletins and their usefulness in fulfilling the purpose for which they are intended.

COLON "NORTHERS."—Commander Converse of the U. S. S. *Enterprise*, explains that what is designated in Colon as a "norther" is not necessarily a gale of wind; in fact, the wind frequently does not blow home, and is at such times quite light, but a very heavy ground swell heaves into the bay. When the wind does blow home, no vessel can remain at anchor in safety. Nor is there any prediction of these dangers. The barometer gives no indication. In December, 1890, the port was visited by a very severe type of the norther,—a memorable one; and the only reason there was not more damage to record is the simple fact that there were no sailing vessels present, and the harbor was comparatively clear. The norther was preceded by a heavy swell, but towards evening the swell decreased. Later in the night it commenced to heave in with great force, so that vessels were compelled to leave their wharves.

After daylight the full force of the norther began to be felt, and in a very short time it became so rough that all steamers put to sea. One steamer lying in the harbor with two anchors down, dragged nearly a mile before she could get sufficient steam to go to sea. The norther comes suddenly, and leaves no time for preparations, therefore during their "season" steamers are compelled to keep up steam constantly, ready to move at a moment's notice. It would be almost impossible to get up anchor without damage to the ship at such times.*

Mr. Everett Hayden, Marine Meteorologist of the Navy Department, commenting on this "norther," says: "The weather preceding the very severe norther in the Caribbean Sea from the 19th to the 21st of December last is illustrated by the above map [Pilot Chart of N. Atlantic, Jan. '91], which shows the conditions over the eastern United States, Mexico, and the western Atlantic, on the morning of the 17th. The conditions are typical of those that always accompany northers, which, it will be noted, are winds from an anticyclone central over northern Mexico and Texas, or even farther north, when there is a storm, or region of decidedly low pressure, moving up the Atlantic coast from about the Bahamas or the Gulf of Mexico, It will be seen from the above map that as the Texas anticyclone moved slowly eastward, the north-westerly winds in its front swept down through the Yucatan Channel, and, combining with the north-easterly winds prevailing over the Caribbean Sea, sent very heavy northerly seas into Colon. The name 'norther' is applied to the heavy sea, even though the wind itself does not reach as far south as Colon ; in the present case, however, it doubtless reached far south of the isthmus, into the Pacific."

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* *Notice to Mariners*, U. S. Hy. Off., Feb. 28, 1891.

ETHNOLOGY.—Mr. Albert S. Gatschet has handed the Director of the Bureau of Ethnology, as the result of long and patient study, his report upon the Klamath Indians of south-western Oregon. This tribe from time immemorial has inhabited a country surrounded by mountain ridges upon the eastern slope of the Cascade range, in the south-western part of the territory now forming the State of Oregon. The two main bodies forming the people are the Klamath Lake Indians and the Modoc Indians ; the latter well remembered on account of the "Modoc War" of 1872–73, the murder of Gen. Canby, etc.

This report, which is the long deferred volume 2 of *Contributions to North American Ethnology*, deals with the beliefs, legends, traditions, government, social life, and more extensively the language of this secluded people. An ethnographic sketch of one hundred pages is followed by texts of the Klamath language, with explanatory notes (about 200 pages), after which is a grammar, of about 500 pages. A second part of the work, soon to be issued, will contain the Klamath-English and English-Klamath dictionary. This work, by one of the most painstaking American ethnologists, constitutes the most extensive contribution to ethnographic science yet made in this country.

Alaska Boundary.—The surveying parties sent out by the Coast Survey at the instance of the Department of State for locating the boundary line at points on the Yukon and Porcupine rivers, at or near the 141st meridian of west longitude, having completed that work, the location of points in south-eastern Alaska, and the line of the "ten marine leagues from the coast line" will soon be commenced. The data and maps resulting from these surveys are designed to be used by the Government in the negotiation, adjustment, and definite settlement and location of the boundary between Alaska and British Columbia. When the results of this portion of the survey are made known, we shall have another and probably a final determination of the altitude of Mount St. Elias.

The late Congress did not sanction the plan of the Secretary of War for an exploration of Alaska by "a thoroughly equipped expedition."

Pacific Cable.—During the closing hours of the last Congress the provision for cable communication between San Francisco and the Hawaiian Islands, which had been attached to the Diplomatic appropriation bill, fell into the hands of a conference ("trading") committee, and was lost.

This measure has been strongly urged by Presidents and Cabinets of both political parties and by the Foreign Affairs Committee of both Houses. Lieut. Richardson Clover, Hydrographer U. S. Navy, appeared by request before the Committee on Foreign Affairs on the 30th of January last, and made the following very clear argument :

" I will first state that the Sandwich Islands are the key to naval and commercial supremacy of the Pacific. Looking on gnomonic chart of the Pacific, where straight lines are routes of great circle and consequently the shortest distance between two points, you observe that Honolulu lies directly on the line between San Franciso and Sydney, Australia. Now draw a line from Valparaiso to Yokohama and again you cross Honolulu. Not only are these the shortest routes but the most advantageous in all respects and are used to-day by both steam and sailing vessels.

" When the Nicaragua Canal is completed the importance of Honolulu will be much enhanced, for it lies directly in the route of all vessels bound to ports of Asia, though vessels from the China or Japan coast to the canal will find a better route farther north. Lay a straight line, from a point off the Pacific end of the Nicaragua Canal, on your gnomonic charts to Yokohama, and you will no doubt be surprised to see that this line or the great circle course runs directly up the west coast, passes about 300 miles from San Francisco, and skirts the Aleutian Islands. Along this route, between Japan and our own coast, the great Japanese or Kuro-siwo current, analogous to our Gulf stream, flows to our shores, and the prevailing winds are in the same direction : past Honolulu, on the contrary, there is a westerly current, and westerly winds prevail.

" In the long voyages necessary in the Pacific, these facts cannot be ignored by even high-powered steamers. The consequence will be that between the Nicaragua Canal and Yokohama vessels will naturally pass via Honolulu, and when making the passage this way will touch at San Francisco. Under such conditions, can we afford to be without direct cable connection with Honolulu ?"

Major Charles E. Dutton, U. S. A., who lately visited the Hawaiian Islands, made some highly interesting remarks at a recent meeting of the National Geographic Society. Major Dutton is a gentleman of very wide experience and an accomplished scientist. Among other things he said : That the main attraction to travellers is the two active volcanoes. They are of great volume and quite extraordinary, the main one (Mauna Loa) being probably the greatest individualized mountain mass in the world. He thinks that one's ideas as to volcanoes are changed materially in view of the Hawaiian phenomena. Mauna Loa is 14,000 feet above the sea level, but its slopes extend so far below the level of the ocean that if the mountain were measured as it rises from the bed of the sea, it would have a base area of one hundred and eighty miles in diameter and a height of 32,000 feet. Of the two vents, one is 10,000 feet lower than the main one. The eruptive action is quiet, infrequently showing any signs of explosiveness or of the terrible force that characterizes many historic volcanoes. This, he said, is due to the small amount of water and vapor in the midst of the lava. The lava wells out and flows over the surface of the country quietly. The mountain is in process of building. The slopes are very gentle, the steepest being only about seven degrees. Ascent is not difficult if one knows the way, otherwise it is next to impossible. The way is through lanes that have been formed between the lava streams. There are as yet no spurs, ravines or gorges, but when the fissures through which the rain sinks, have been cemented up, the waters will make rivers, and gradually ravines and gorges will appear. The neighbor of Mauna Loa is Maunaka, an extinct volcano, a little higher, but steeper. He says that the landscape, aided by flowering trees and fronds of exceedingly large growth, is one of the most beautiful in the world, and that scenery of great grandeur is found on the mountains of Haliakala, the top of which, at some time or another has dropped out of sight, forming a great pit or gorge that rivals the glories of Yosemite.

The Hawaiian of the present day is not quite on a level with the whites of cultivated society, yet as a race the people are far advanced. Nearly all read and write in their own language, while an increasing percentage understand English.

ARTESIAN WELLS.—When Congress and the Director of the U. S. Geological Survey failed to agree, or held different views as to the methods to be employed to bring about practical irrigation in the arid regions of the West, the Secretary of Agriculture was directed to investigate and determine the proper location for artesian wells for irrigation purposes within the area west of the 97th meridian, and east of the foot-hills of the Rocky Mountains. The work was organized on a basis of engineering, geological and statistical inquiry, and covered an area of over 658,000 square miles.

The results found are, that the Dakotas have an artesian basin of vast extent, and that the physical geography of that region strongly testifies to the probable permanency of the water supply. It is believed that this basin is the largest and strongest yet discovered in the United States, or even in the whole world.

In the eastern portion of Wyoming a number of small artesian basins may be found. About sixty-five wells are reported in Nebraska. In the central section of the great plains region extending from the northern boundary of Nebraska to the southern boundary of the Indian Territory were found about 200 flowing wells, with several hundred more in which the water rises, but does not reach the surface. In Colorado four distinct artesian basins are reported, that of Denver alone containing about 350 wells. But the most remarkable basin in Colorado is just outside the west line of the investigation. Over 2,000 wells have recently been sunk in this basin. No basins of value have yet been developed in New Mexico. There are indications of an important artesian basin in the vicinity of Waco, Texas. There is a water-bearing stratum over 1,800 feet below the earth's surface, and about 1,200 feet below the level of the Gulf of Mexico. An 8-inch well, 1,834 feet deep, has a flow of 833 gallons per minute.

Facts and statistics bearing on irrigation have been collected by the Census Office, and Bulletin No. 35, recently issued, presents for the territory of Arizona the results of a careful and thorough investigation as to the extent to which irrigation is practised, the peculiar conditions prevailing in different localities, and the success that has so far attended the application of this system of agriculture, more particularly from the standpoint of the user of water.

Explorations in Palestine.—The directors of the Palestine Exploration Fund, London, having after the lapse of many years received during the past season permission from the Sultan, under certain restrictions, to renew their excavations and researches in the Holy Land, made arrangement with Mr. Flinders Petrie, a well-known and successful explorer of Egypt, to carry on the work, the Mediterranean coast in the vicinity of Ascalon and Gaza being selected as the field of operations. Mr. Petrie's discoveries, though interesting, appear to be hardly up to his expectations, and in some respects were quite disappointing. It is probable the work may be continued another season.*

The number of visitors to Jerusalem during 1890 exceeded that of any previous year, Americans preponderated over any other nationality. The English were the next largest in number. In this statement no estimate is made of the large bodies of pilgrims who go there to worship.

ICELAND.—In some notes on Iceland published in Edinburgh in the latter part of 1890, it is stated that few tourists visited the island last summer, and none at all the northern part, which by many is considered a more pleasant part for a summer holiday than the south. Travelling is difficult on account of the absence of roads and want of accommodations. Until quite recently there were bridle-paths only, and no proper roads. The first road made was begun about two years ago, and does not yet extend further than a few miles out of Reykjavik.

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*Consul Gillman to the Department of State.

STROMNESS, ORKNEY.

BULLETIN

OF THE

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Vol. XXIII **1891** **No. 2**

ORKNEYS AND SHETLAND.

BY

PROF. CHAS. SPRAGUE SMITH.

There is perhaps no region, so easy of access to the European traveller, that offers more fresh and varied interest than the group of islands lying north of Scotland. The student of natural science can follow there in the steps of Hugh Miller and, with his geological hammer and chisel, force open the stone tablets whereon the sea life of a remote past has left its records. The archæologist, who has not made beforehand a special study of this locality, will be amazed at its wealth of rude prehistoric monuments, and the hamlets are so sparsely scattered, the isolated farms so few in number, that it is not hard to think away the present and live for an hour amidst the moving life of the ages and races now extinct. The lover of the wild and the picturesque in nature can gratify also his predilections, without renouncing the nightly shelter and the daily refreshing offered by simple and comfortable hostelries.

The Pentland firth, that separates the Orkney islands from Scotland, is less than nine miles in width at its broadest point opposite Hay, while Duncansbay head, Scotland's northeastern cape, is only about six miles distant, from the nearest point of South Ronaldshay (Rognvald's island) the southernmost large island of the group. Mid-channel lie the smaller islands of Stroma and Svona and the rocky islets known as the Pentland Skerries. The actual separation of the archipelago from Scotland is thus insignificant, but the tides that sweep through this narrow channel and between the islands have a royal movement and, if they run counter to the wind, a mighty tussling ensues.

One familiar with Orcadian gales describes them thus: "All distinction between air and water is lost, the nearest objects are obscured by spray and everything seems enveloped in a thick smoke. Upon the open coast, the sea striking upon the rocky shores rises in foam for several hundred feet and spreads over the whole country; . . . rocks of many tons in weight are lifted from their beds; the roar of the surge may be heard for twenty miles; the breakers rise to the height of sixty feet."*

Under ordinary conditions, however, the passage across from Thurso, Scotland, is only a somewhat protracted ferriage and the swaying of the ocean-floor only sufficient to add zest to the few hours' voyage.

The traveller, therefore, who is imbued with the customary ignorance of geographical details, is surprised and delighted on rounding Duncansbay head to find, instead of a barren turbulent channel some 50 miles in width, the sea in front blossoming as it were immediately into foam encircled islets, while the whole horizon to the north is crowded with larger islands, separated the one from the other by winding passages of inconsiderable dimensions.

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*"The Orkneys and Shetland," by John R. Tudor, p. 198.

There are said to be 56 islands in the Orkney cluster, of which 30 are inhabited. Hardly one fourth of the islands however are large enough to rank as independent members of the group. The largest island, called "Pomona"* or "The Mainland," is, to judge by the eye, equal in dimensions to the combined area of all the other islands. Its greatest length is approximately 25 miles and breadth 15 miles. The main axis of the group is N. E. and S. W. of the mainland and several of the other larger islands N. W. and S. E.

The characteristic feature of the Orkney group of islands is the low rounded central ridge, sloping gradually on both sides to the sea. The upper courses of the hills are brown with a dense growth of heather, the lower occupied by farms.

The brown unreclaimed land however often holds apparently the entire slope from crest to shore-line.

There is a vivid suggestion here of the clearing, where tillage and meadow-land are steadily sturdily making inroads upon the original domain of the forest.

†Here the earlier tenant was of course the heather, for trees do not grow in the islands, save in especially favored localities, or where artificially cultivated, and do not therefore form a feature of the landscape. And, if we may trust the old Norse records, there were no forests in the islands at the time of their conquest by

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* Called Hrossey, horse-island, by the Norsemen.

† In the Heimskringla, (edited by Unger) page 69, we read "He (*i. e.*, Einar) was called Torf-Einar because he caused peat (torf) to be cut and used as fire-wood; for there was no wood in the Orkneys."—Einar was one of the first Orkney earls.

Harald the fair-haired, King of Norway (close of 9th century).

Among the southern islands, Hoy (Há-ey—high island) is the most picturesque. Its bold, precipitous sea-walls of old red sandstone and its solitary rock pillar 450 feet in height, known as the "Old Man of Hoy," give to it a place apart among the islands of the group. Its rough-hewn shore line is one of the boldest and most interesting formations of that character in Great Britain.

My own impressions of the Orkney islands as a group are derived from a sunset-glimpse north and south from the vantage ground of Wideford hill (740 feet high), back of Kirkwall, the capital of the Orkneys, and from a delightful summer afternoon sauntering on shipboard northward, with the islands to east and west almost within hailing distance.

Yet, in a broad sense, to have seen one island is to have seen all; the general features are the same; though some of those to the north are so low lying, that it is difficult to determine from a near distance where the line of demarcation between sea and land is drawn.

The first outlook from one of nature's sentinel towers over an unfamiliar landscape is not soon forgotten. I shall always remember the magnificent sense of being poised mid-air, that came when, having gained the crest of one of the higher peaks in the western Adirondacks, nothing met my eyes but close pressed forests, with lakes dotted here and there and the long lines of hills, wearing still their native garb.

The Orkney hill-top was gained about nine o'clock of a July evening just after sunset. There was no dazzling glare of horizontal rays in the west to bewilder the vision, and no clouds save in the north to veil the landscape. Island behind island, the archipelago lay strewn about me, with darkening stretches of blue and black water between, roosts, as the islanders call them, or swift tidal races. The northern peaks of Scotland, Morven and the hills of Sutherland, softened by the paling light into cloud mountains, limited the view southward.

The monuments of the prehistoric races, tumuli, isolated monoliths and stone circles, stretched from the foot of the hill westward across the mainland in an interrupted chain.

I had but to turn to my companion, a canny Orkneyman, combining the grocer, the baker and the archæologist, to realize fully the present conditions here under the influence of Scotch thrift; while the darkening tidal-ways vividly recalled the strong cruel age of the Vikings, and the stones of Stenness, dimly outlined against the western sky, spoke of the half mythical, half historical Pictish traditions.

As one leaves the Orkneys behind, ere the last lighthouse on the northernmost sand-spit is lost to view, an island is seen far to the north-east. Fair island (Fritharey—Island of peace, according to the Saga) lies about midway between the Orkneys and Shetland, being some twenty-five miles distant from each group. It is, however, considered as belonging to the latter. Its shores are seldom visited, though mail-steamers pass almost daily within a few miles of its cliffs.

There is thus no severing of the land-tie upon this northern journey, since, before Fair-isle is reached, the southernmost promontories of Shetland-mainland come into view and soon, far away to the west, the bold beautiful form of Foula (Norse Fogl or Fugl-ey, bird-island) the outlying member of the Shetland group. When about 9 P. M. we came abreast of Sumburgh-head, Shetland's southeasternmost cape, all of nature's manifestations were attuned, as it were, into harmony with the bolder landscape. The air was more cold and crisp, the sea more masterful; there was a sense of power pervading everything, every buffet of the wind, every swell and toss of the wave. The Norsemen called this stretch of sea betwixt Fair-isle and Shetland Dyn-röst, the dinning or thundering race.

Shetland is said to consist of about 100 islands, great and small. Here however, more markedly even than in the Orkneys, one island predominates. The Mainland, so-called, *i. e.*, the main island, is according to Tudor, some 70 miles in length, by 30 in its greatest breadth.

Its coast is however so cleft by fissures of varying width, that no part is more than three miles distant from the sea. Beside the mainland and the isolated islands, Foula and Fair-isle, only Unst, Fetlar and Yell properly rank as independent members of the group.

The main axis of this group is north and south, slightly N. E. and S. W., of the more important islands the same. All the islands with the exception of Fair-isle and Foula are so closely massed, as to seem parts of one whole. The extreme north and south dimension of the group between Sumburgh head and Muckle Flugga light-house is, according to my measurements, seventy miles. From Muckle Flugga light-house to Duncansbay head, Scotland, is about 150 miles, while the north and south measurement of the Orkneys gives about fifty miles.

The northern group differs in almost every particular from the southern, from the character of its rock-formations to that of its people. Those who have explored the western coast with its numberless fissures, geos, voes, wicks and firths* describe the Shetland coast-line as a miniature Norway. My own observation extends only so far as the vision can reach from hills near Lerwick, the capital, and from excursions on foot and in *machine* south and west of that point.

To one familiar with Norway, the Faroes and eastern Iceland, the physical contours of the Shetland group afford a distinct reminiscence of the still bolder, and more impressive scenery of northern Scandinavia. The dorsal ridge of the Shetland islands is sharp, not rounded as in the Orkneys. The upper courses of the hills are usually clothed with heather, but not infrequently bare of vegetation, either through denudation, or because the turf has been stripped off for fuel. At the base of the angle of sharp descent, there is a black peat deposit sloping far down toward the sea-line.

Only a narrow fringe of farm-land, green meadow and garden extends along the coast. There is thus no suggestion here, as in the Orkneys, of a fruitful effort on the part of man to redeem nature's waste-places. The struggle under normal conditions would be indeed apparently hopeless. In valleys back from the sea, however, notably in Tingwall, the garden of Shetland, the natural conditions are more favorable to agriculture; but, so far as my observation reaches, the Shetland tenant farmer or crofter must look almost entirely to the sea as his source of support. It is a common saying in the islands, that the Shetlander is a fisherman owning a small farm, the Orkneyman a farmer owner of a fishing smack.

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* Voe, a long narrow bay (Norse Vágr) ; geo a rocky creek or inlet (Norse Gjá= a rift) ; wick an open bay (Norse Vík).

While the general impression received from the Orkney islands is that the condition of the farming class is one of comparative comfort, the reverse is true of the Shetland islands. Nature has built here a strong bulwark against the storms of the North Atlantic, and, whether she smiles or frowns the traveller can share her mood and draw rich inspiration therefrom, but not so the crofter. The meagre strip of tillable land is furthermore accursed by the dower of mediæval conditions and, from the humanitarian stand-point, it is a mournful sight to observe how here, as in a considerable section of enlightened Great Britain to-day, the masses are still enslaved.

The distinctive characteristics of Shetland life cannot be seen until the towns have been left behind. No matter how remote from the highways of the world's commerce and pleasure travel be the land visited, the cities are found to have exchanged in some degree, at least outwardly, their indigenous qualities for a certain cosmopolitan veneer. Even Reykjavik, Iceland's capital, forms no exception.

Leaving the towns behind then and sauntering along the highways or across fields, we observe the seaward slope of the hills scantily dotted with little clusters of grimy stone cottages, repellent enough, but not more uninviting than the typical crofter's-house in northern Scotland or in the Hebrides. Rude dykes separate each group of cottages from the scathold or pasture land outside, Such a cluster of crofts is called a *toon*, or town, a transition stage in the evolution from the Old Norse tún (pronounced toon), a single enclosed holding, to the English town. The section of arable land within the dykes, belonging to each crofter, is usually distinctly separated from that of his fellows though, rarely, the whole is cultivated in *runrig*,* that is, in common. The separate holdings vary from three to ten acres. Oats, bere (a kind of barley) and potatoes form the principal crops.

CROFTERS' COTTAGES NEAR LERWICK, SHETLAND.

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* Land of different tenants is mixed up in alternate ridges or furrows.

The grass growing along the drains that intersect the fields, and a few chance green wisps in the meadows furnish the only hay crop. Each crofter has, beside his section of arable land within the dykes, unlimited right of pasturage in the scathold or hill-pastures held in common by several tenants. The domestic animals, cattle, sheep and horses, are all Scandinavian in origin and diminutive in stature.* The famous Shetland pony, with the introduction of roads, is disappearing; a breed of greater draught-power, such as the Welsh pony, or even the horse, taking his place.

According to Tudor*: "the crofter's cottage was formerly a windowless, chimneyless cabin, to reach which you had to pass through the *byre*, or cattle-shed, that was separated from the human habitation only by the box-beds, that served as resting places for the higher animals." At present, however, the *byre* is usually distinct from the crofter's cottage. This latter consists of two apartments, the *but* and *ben*. The *but* has no floor save the bare earth. There is a fire-place in the centre, but no chimney for the escape of the smoke. The *ben* is generally floored and its fire-place furnished with the added luxury and extravagance of a chimney. The furniture is of the rudest character, consisting of chairs, stools, a wooden sofa, perhaps, and the box-beds. Above the *but* and the *ben* there are rude cock-lofts.

Personally, I visited only a single crofter's-house, lured thither by the bait of deftly woven Shetland shawls and the grandmotherly persuasions of a wily peasant woman. Had I not mother, or wife, or child, who were expecting some woolly mementoes of my Shetland pilgrimage? Were my feet and fingers not aching to be enwrapped within the warm meshes of Shetland socks and mittens? The home was far more comfortable than the typical crofter's house just described, but this greater luxury might be explained by the sybaritic influence of the neighboring capital.

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* See Tudor's Orkneys and Shetland, chap. XII.

A characteristic feature of the rural districts of Shetland is the rude mill. Where walls of rock enclose conveniently a descending brooklet, the Shetlander poises his tiny mill. It is just large enough to spread a roof over the slowly circling stone and allow the peasant miller to sit idly beside it. A stout vertical shaft, riveted to the upper mill-stone, passes through an aperture in the lower. A number of rude boards are jointed to its base, at such an angle as to receive and communicate to the upper stone the momentum of the water. The optical effect is that of a wheel, whose spokes are revolving upon the same plane with the stream, instead of at right angles to it.

A Shetland landscape, when mists, dense with vapor almost as the clouds, are dragging their cold dripping folds over bare hill-side and black moorland, is desolate in the extreme. The thatch resembles straw, that has been rotting in the compost heap. The stone huts are dripping at every projecting angle of their dingy walls. The smoke escapes apparently quite as much by the door ajar as by the hole in the roof, rudely fashioned or not into some semblance to a chimney-pot. The peat-bogs, cut with deep black pits and trenches, reek with oily exhalations. A few gaunt sheep are pasturing by the road-side. Women are seen, crofter's wives and daughters, rearranging the peat-stacks, that line the trenches, or bending low down under their over-filled peat baskets the while their fingers ply perhaps the knitting needles. Men are rarely seen at work, save at intervals a forlorn-looking cowherd. The passer by receives the distinct impression that incapacity, through age or feebleness, has doomed this individual to so unmanly an occupation. It is said indeed by those familiar with the islands, that the men leave the greater portion of the work ashore to their industrious wives and daughters.

But, forget, if you can, the miserable conditions of the crofter's lot and, crossing one of the swift tidal races, that separate the outer islets from the mainland, climb the Noup of Noss.

The ferryman, who has piloted you across the 100 feet or more of water, has had a hard struggle with the swiftly rolling waves, that threatened in their splendid rush to carry boat and all far out to sea. The promontory (Noup, Norse gnúpr, a peak or promontory) slopes gently up from the landside, but the sea has torn away its eastern slope and is undermining the foundations of the western. On all sides it is cut in rough sheer precipices from crest to shore-line, and beneath has been honeycombed by the breakers. This is the home of the sea-birds and the fog-sprent air their natural element. In grand, strong spirals of flight, inward and outward, upward and downward, move the grey and white gulls. You bend over the cliff and, 500 feet and more below* other circles are coiling in and out among the pillared caves, while the water is dotted as with some shimmering winged insect-life. To northward and southward,

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* Height of headland 592 feet.

Shetland's capes, appearing, disappearing, reappearing, stretch their gaunt grey arms far out into the sea. The kiss of the storm is upon your cheek, the cries of the storm-birds and the blended roar of the wind and the surf in your ears. Out of such elements as these was formed the warp of northern poetry and the sunlight, that shall fill to-morrow this strong, desolate world with its burnished rays, furnished the woof.

I discovered during my stay in the Orkneys nothing in the conditions of the farming class, that was so unhackneyed and suggestive, as that everywhere present in Shetland. The Orcadian peasant's house, while rude and primitive, bears outward testimony to thrift and internal comfort. The picturesque desolation of the black, sodden Shetland moors and wretched *toons* is entirely absent. The Orcadian peasant seems also more prosperous, more alert than the Shetland crofter. Those,* however, who have seen the Shetlanders at the *haaf*, or deep-sea fishing stations, describe them as physically a magnificent race of men, distinctly Norse in type, tall, fair-haired and blue-eyed. The sea is indeed the element that should attract and develop the highest type of Shetland manhood.

Tudor's testimony fully confirms my own impressions with regard to the prosperity of the Orcadian peasantry.† "The Orkneys, at the present time (1883)," he says, "are probably as thriving as any portion of Her Majesty's dominions. During four months spent in wandering to and fro in the islands, in 1880, the writer never once saw a bare-footed man, woman or child, nor was he once accosted by a beggar. Bankruptcy among the farmers has never been known and over a million (pounds) was stated to be lying on deposit in the banks, to the credit of the farmers and peerie (petty) lairds."

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* Tudor, page 161.

† Tudor, page 107.

The cities of Orkney and Shetland consist mainly of single, narrow, winding streets following the coast-line. These are paved usually with broad slabs and lined with houses of varying height, architecture and age; none, however, or the fewest, offering especial interest.

I found the better class of the citizens intelligent, well-informed and hospitable. The Orkney man seems in every respect a Scotchman, while the Shetlander has not altogether lost the imprint of the Norse colonization. The Scandinavian language, as I was informed, survived in remote districts of Shetland until a recent period. The population of the Orkneys in 1881 was 32,037 souls; of Shetland, 29,709;* of Kirkwall, 3,923; of Lerwick, 3,500. The acreage under cultivation in the Orkneys was 108,795 acres; in Shetland, 58,437; under grain, Orkneys, 38,294 acres; Shetland, 10,774. (Total acreage of Orkneys and Shetland, 598,726.) Average yearly temperature at Bressay opposite Lerwick, Shetland, 45.4° (Fahrenheit); at Kirkwall, Orkneys 45.9°. Average August temperature, hottest month, 54.8° in Shetland (Bressay); 54.7° Orkneys (Kirkwall); January, coldest month, 38.9° Shetland; 38.6° Orkneys.

The history of these islands is interesting. Originally they were inhabited by Pictish tribes, who were converted to Christianity, probably by some of the followers of Columba, that famous saint who, in the sixth century, founded a cloister in Iona and became the apostle of the Picts. Toward the close of the eighth century, Norse vikings began to establish themselves there, the islands offering a convenient centre for their piratical expeditions north and south. In the following century, Harald the fair-haired reduced all of Norway under his sceptre. At this time the great emigration to Iceland took place. A large number of Harald's enemies sought refuge in the southern islands and from thence were ever returning to harry Norway. Harald resolved to rid his coasts of this scourge and undertook, therefore, an expedition (880–84) against the islands, that resulted in their union with the Norwegian crown. The islands remained under Scandinavian control, governed vicariously by earls or directly by the crown, until 1468. Denmark, Sweden and Norway formed at that time one kingdom. A dispute had arisen betwen Christian the First, king of the three northern states, and James the Second, of Scotland, and it was agreed to settle it by the marriage of Margaret of Denmark and the heir of the Scottish crown. To offset the dowry given by James, Christian pledged first the Orkneys and then Shetland to the Scottish crown, with right of redemption. The forfeit money was never paid and the islands remain *de facto* a possession of the kings of Great Britain. The history of the islands, during the Norse period, is full of dramatic interest and no one should visit that archipelago, whose nomenclature and memories are so entirely Norse, without first reading the record contained in the Orkneyinga Saga.

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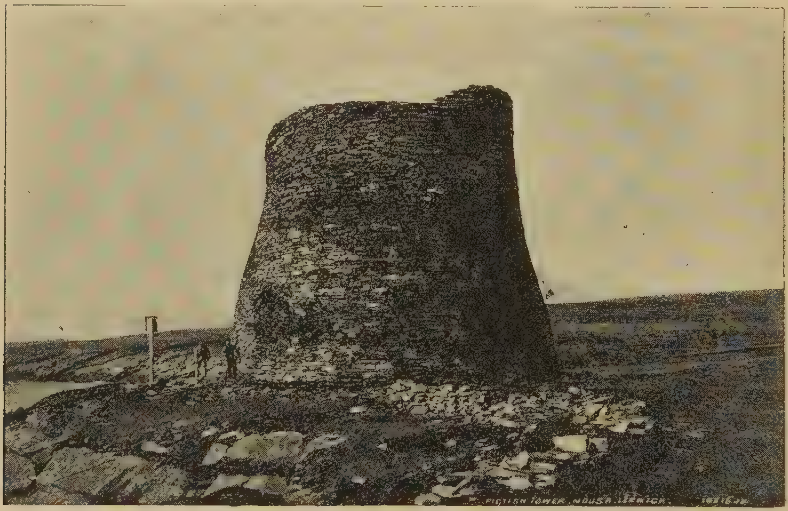
* In 1831, Orkneys, 28,847; Shetland, 29,392. 1861, Orkneys, 32,395; Shetland, 31,670.

But there is a more remote and mysterious civilization than the Norse, whereof these islands guard rich vestiges. It is generally agreed that the rude prehistoric monuments found here are the work of Pictish peoples, although some authorities (not the best nor the most numerous) would assign to the Norsemen the round stone towers.

The prehistoric monuments of the Orkneys and Shetland, consist of the brochs, or circular towers; the stone-circles and isolated standing stones; the chambered mounds or cairns; the underground dwellings, styled variously eirde-houses, weems or hypogea, and the burial mounds or barrows.



BROCH OF MOUSA, SHETLAND.

The best specimen of the first of these structures is found in the Shetland islands, and is known as the Broch of Mousa. (Of 374 known broch-sites, 75 are in Shetland, 70 in the Orkneys, and 139 in the two northern counties of Scotland, Caithness and Sutherland.)

The broch is a hollow circular tower of dry-built masonry, with an exterior diameter varying from 70 to 40 feet. The mean height of the brochs, according to the best authorities, was about 50 feet. From without, it presents an unbroken surface, the only aperture being the low entrance to the interior court.

In certain cases, the tower was protected by outworks. The broch of Clickemin, *e. g.*, stands upon a holm or islet in a fresh water loch, just outside of Lerwick. A long narrow land spit, or causeway, leads from the shore to the islet, and over this a covered guarded passage seems to have been carried, affording the only entrance to the broch. The entire islet was surrounded by a strong wall of circumvallation, and still further protected by a guard-house, in the form of a segment of a circle, placed on the land-side between wall and tower.

The thickness of the walls of a typical broch is about 15 feet. Up to a height of 8 feet, the wall is solid save where space has been left for 2 or 3 oblong chambers, with rudely vaulted roofs, connecting with the central court. Above the height of 8 feet, the wall divides into two sections with an interspace, some 3 feet in width. Here a gallery, formed of stone-slabs, encircles the tower between inner and outer wall. This gallery connects by a flight of steps with the court below and is lighted at regular intervals by openings pierced in the inner wall. There are several tiers of these galleries, varying in height from 5 to 6 feet. The flight of steps leading to the higher gallery forms, in every instance, a solid partition wall in the lower tier. These towers do not seem to have been either roofed or floored, and the purpose and period of their construction can only be conjectured.

Save for the brochs of Mousa and Clickemin, the archæological interest of the islands, however, centres distinctly in the southern archipelago.

From Scapa in the south-east of the mainland, Orkneys, to Skail in the west, there is almost a continuous line of interesting prehistoric structures. "Nowhere else," says Tudor, "upon British soil are found so many relics of the prehistoric past, as in the six or seven miles of Orcadian soil, which commence with the chambered mound of Maeshowe and end with the weem of Skara Brae."

I was initiated almost immediately, upon my arrival in the Orkneys, into the mysteries of local archæology. A stone's throw below the crest of Wideford hill, there is a chambered mound, that was opened some forty years ago. After sunset, we descended the slope and my Kirkwall friend guided me to the edge of a pit, half filled with stones, thrown in by idle urchins.

We had soon cleared the pit, and my companion, lying prone upon the ground, pushed himself feet foremost under a projecting slab and disappeared in the darkness, bidding me follow. I did so, though not without difficulty, and, by the light of a match, saw that we were in a small vaulted chamber of beehive construction, some 6 feet in height. Originally a low narrow passage, 15 inches high and 22 broad, led from without to a central chamber (the pit we first entered) and, from this in turn, other similar passages to 3 or 4 side chambers. The whole masonry was then covered by a mound of earth. A similar principle of construction obtains in all the chambered Orcadian mounds of which Maeshowe is at once the most conspicuous and the best preserved. It is assumed, that these mounds were used as dwelling places and the narrow dimensions of the passages have either given birth to the tradition, or served to corroborate it, that the Picts or *Pechts* were a race of dwarfs. Tudor is unaware of the existence of any chambered mounds in the Shetland islands.

Wideford hill and my friend's rich archæological collection, with its spoils from brochs, chambered mounds and barrows, opened pleasantly and suggestively for me the volume of Orcadian antiquities. On the following day, taking the *machine* from Kirkwall, I dismounted half-way between the 9th and 10th mile post. There, with Maeshowe, begins that unique file of rude prehistoric monuments. In my own experience, I know of nothing comparable, in vivid suggestiveness of a remote past, to this walk, unless it be the stroll along the Via Appia to the tomb of Cecilia Metella and beyond, or the ride from Naples to Cumæ. Indeed, the Latin civilization, on account of its closer kinship with our own, seems less remote in time than that prehistoric northern life.

Maeshowe, or the maiden's mound, as it has been translated, was formerly known to the Orcadians by the euphonious name of "the abode of the Hog-boy." Hog-boy, however, is simply a perversion of the Norse *Haug-búi* or mound dweller. It is an imposing mound, 36 feet in height by 92 in diameter, and stands in the centre of a circular platform, 270 feet in diameter. This is in turn surrounded by a trench 40 feet wide, and from 4 to 8 feet deep. A covered passage, 54 feet in length, conducts to the central chamber. This passage can be traversed with comparative ease in a stooping posture. The central chamber is spacious, and the side chambers are reduced to mere pockets in the walls, varying in height from 3 feet 4 inches, to 3 feet 6 inches. There are various rune-scratchings and other Norse inscriptions, such as a dragon and a worm-knot, traced upon the walls, indicating that the mound was frequently visited by the Northmen. It was called by them Orkahaug* (perhaps connected with old Norse Orka, to be strong to work, and meaning the strong howe).

On returning to the road, we are soon arrested by a tall monolith, rising in the midst of a field of grain, one of the many isolated standing stones scattered about the islands. Whether these were intended to serve as way-marks, as memorials of the dead, or for some devotional purpose, is uncertain. A half mile further, we reach the stones of Stenness (stone promontory), the first of three stone circles† standing in close proximity. It consisted originally of a low truncated mound, some 3 feet high and 104 feet in diameter, surrounded by a broad ditch, and this in turn by an embankment. Only three of the original circle of stones remain, two erect, one, the largest, prostrate. Its dimensions are 19 feet by 5 feet, by 1 foot and 8 inches. Its weight is conjectured to be 10.71 tons. On the western side of the circle are the remains of a cromlech.

About 150 yards north of the ring of Stenness, stood formerly a monolith, similar to the others, but with a hole cut through it near the centre. This was called the Stone of Odin, and played quite an important rôle in the local customs and traditions. This stone together with three others, forming part of the Ring of Stenness, is said to have been converted in 1814 by a tenant farmer, a foreigner, into rubble wherewith to construct byres or cattle sheds. The firm hand of the law intervened to check the vandalism, and the fellow was so thoroughly boycotted by the indignant peasantry that he left the country.

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* Orkneyinga Saga, p. 187 ; edited by Gudbrand Vigfússon.

† There are 5 stone circles in Shetland, 3 in Unst, 2 in Fetlar, but they are composed of smaller stones laid flat on the ground.

STONES OF STENNES, ORKNEY.

From the stones of Stenness, the path slopes down to the Bridge of Brogar, a narrow causeway between two broad fresh-water lochs, Stenness and Harray. At the eastern end of the bridge, as I passed, workmen were demolishing what appeared to be a prehistoric mound, in order to use the material for broadening the causeway. Close to the bridge, rises the solitary monolith, known as the Watch-Stone (16 feet in height,) and it is well named. It seems to stand as a sentinel at the entrance of some primeval Holy of Holies. For when the bridge is passed, tumuli abound on every side, and in the centre rises the circle of Brogar. Thirteen slabs are still erect, 10 lying prostrate, out of perhaps 60 that composed the original circle. Their average height is 9 feet, the tallest being 13 feet 9 inches in height above the ground. The diameter of the circle is 340 feet, and this is surrounded by a broad and deep moat crossed at east and west by narrow causeways. In the centre are the remains of some structure, perhaps a cromlech.

Orcadian peasants formerly called the Ring of Brogar the temple of the sun, and that of Stenness, the temple of the moon. On the first day of each new year, there was a gathering of the country folk at the Kirk of Stenness, near the stone of Odin. In feasting and dancing the hours and days sped. Naturally, in the unwonted rest from toil and boisterous merry making, the god of love found and improved his opportunity. When the hearts of man and maid were finally agreed, setting forth together from the company of their kinsfolk and friends, they sought the temple of the moon. There, in the man's presence and hearing, the maiden knelt and prayed to Odin to help her to be faithful to her lover. Thence to the temple of the sun, where the man in his turn besought the succor of the higher powers. Finally, their hearts and minds confirmed by this consecration in wish and purpose, they went to the stone of Odin and, standing, one on one side, the other on the other, clasped hands through the aperture and swore a solemn oath to be faithful each to the other.

Though it was a sacrilegious and despicable thing to break such an oath, it is reported that another custom, equally valid, facilitated the loosing of a tie thus solemnly contracted, if subsequently proven irksome. Husband and wife betook them as before to the Kirk of Stenness and then separated, the one going out by the north door, the other by the southern, to single blessedness, or to second nuptials, as they chose.

A mile more of the roadway passed brings us to the Ring of Bukan, a circle of a similar character to Stenness and Brogar, but of smaller dimensions. Here all traces of the monoliths, if any once existed, have disappeared. Thence we may saunter on for several miles, with nothing but the backward look to suggest the past, and exchanging greetings with the wayfaring peasants, catch a few glimpses of Orcadian life and thought. A farmer is repairing his stone hut with slabs of old red sandstone quarried not far away. While we are sitting upon his door-step for a brief quarter of an hour, questioning and questioned, he brings forth from within doors specimens of fossil-fishes, ichthyolites, that would kindle envy and delight in any geologist's eyes.

Abandoning the road-side and climbing the brae, all clad in gala-robes of magenta heather-bloom, we descend its western slope and knock at the door of a modest farm-house. A little shoeless lassie guides us through the cow-yard and across fields to a stone wall. Just beyond are the Stones of Via, the remains of a cromlech. If the afternoon be not already far spent we can devote its remaining hours to inspecting the Weem of Skara Brae, a series of cell-like underground chambers, arranged on either side of an irregular passage.

Of burial mounds, over 2000 specimens can be numbered in the Orkneys alone.* They are believed to be both Pictish and Scandinavian in origin.

I have nowhere come into such close touch with the prehistoric past, as in these islands. The very desolation of the environment, the almost entire absence at times of any near objects that suggest the present, leave the mind free from the intrusion of the forms of modern life and permit a retrogression in thought far back into the past. The devout spirit to-day, with the ever changing yet changeless arch of blue and clouds above, and the eternal, yet ever shifting forms and colors of nature in lakes, sea, meadow and mountains environing, can worship, as the devout spirit worshipped unnumbered centuries ago, within the stone circle of Brogar and before the crumbling fragments, remains of a rude altar.

And if a storm, strong, swift, sullen, is moving southward, shrouding the line of the hills along the northern horizon and its shadow, dun and cold, is advancing steadily toward you across the northern loch, while the loch to the south, the moor, the yellow, sparkling sea and the brown hills of Hoy are all glowing with the light, the life and the joy of a clear summer morning, you will turn away from the world of sunlight to the world of shadow and welcome that weird, strong presence, that is moving toward you, mantled with the gloom of the storm.

As the headlands of Shetland invite to communion with the Norse spirit, so the rude stone circles of the Orkneys to communion with the prehistoric spirit.*

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* Tudor, page 16, testimony of Captain Thomas.

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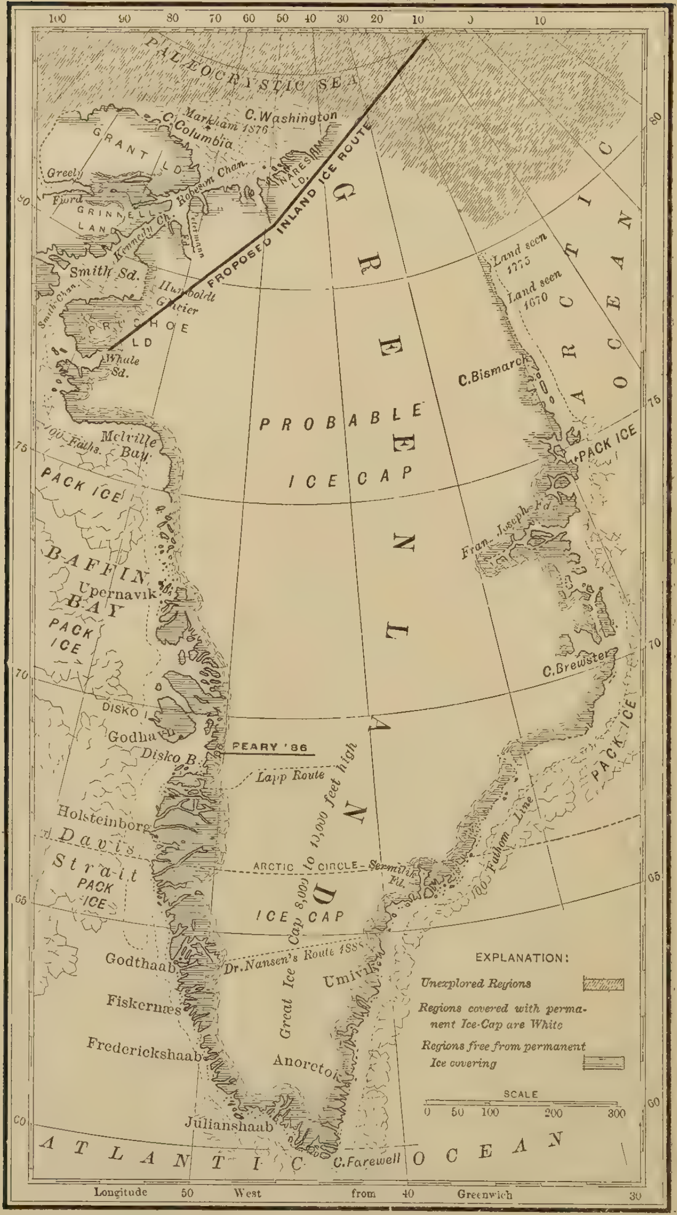
* We have not referred in this paper to the monuments of mediæval architecture existing in these islands, of which the St. Magnus Cathedral at Kirkwall is the most important. Other interesting monuments are the ruins of the earl's palace and of the bishop's palace at Kirkwall, of the ancient church of St. Magnus, Egilsay, Orkneys, and of Earl Patrick's castle at Scalloway, Shetland. For a full description of everything relating to the islands, the reader is referred to Tudor's work previously cited.

SKETCH-MAP OF GREENLAND

Reduced from the original by J. G. BARTHOLOMEW, F. R. S. E., in the Scottish Geographical Magazine, April, 1890.



A PROPOSED EXPLORATION OF NORTHERN GREENLAND.

An Address before the American Geographical Society, April 13, 1891,

by

R. E. PEARY, U. S. N.

Mr. President, Ladies and Gentlemen:

The thousand and one little details of preparation for an expedition into a region, where literally nothing can be purchased or found, have so engrossed my attention recently that I have been unable to prepare the finished paper that I should have liked, and that would have been appropriate for this audience.

I hope, however, that I may be able to put before you a correct and realistic picture of the mysterious "Land of Desolation," and to explain to you what I shall attempt to accomplish.

I fancy there is not one in my audience but knows the famous hymn beginning "From Greenland's Icy Mountains," yet I think most of you will be surprised to learn that Greenland has a history, full of events as strange as its own midnight sunshine and far stretching snowfields. Nine hundred years ago, Erik, an Iceland outlaw, discovered the country and named it Greenland, "because," he said, "people would sooner be induced to go thither in case it had a good name." From the colony founded by him, his son Leif and other restless spirits sallied forth to the discovery of the New World.

Centuries after, from these iceberg-haunted seas, went forth a gleaming pile of walrus tusks, tribute for the Crusades.

Then a hostile fleet descended upon the colonies, and ravished away many of the inhabitants to replace those carried off by the plague or "black death" in Europe. Strange anomaly; Greenland repopulating Europe! Finally, the last of the shipmasters who knew the route to Greenland are said to have been assassinated by German merchants to whom they refused to sell their cargoes, and Greenland, in the fifteenth century, dropped out of the world and was absolutely forgotten, before the voyages of Columbus.

A century or more later, Davis rediscovered the "Land of Desolation," but the colonists had disappeared and to-day, though the Danes occupy nearly all the habitable land in Greenland, only scattered ruins of houses and churches have been found, and these are mute as to the mysterious fate of their former inhabitants.

Geographically and topographically, Greenland has been, since the day its black cliffs loomed through the Arctic fog upon the eyes of Erik, a land of mystery, and a source of constantly increasing interest and speculation.

It has been traced further into the *terra incognita* that encompasses the pole than any other land on the globe, and there are reasons for thinking that its unknown Northern headland may be one abutment of a bridge of islands, over which, through years of Arctic summer day and winter night, a portion of our race slowly migrated from Siberia, *via* the Pole, to this hemisphere.

Its interior is the last retreat of that glacial epoch which for ages submerged Northern Europe, and Northern North America, even as far South as the northern part of this State, in its icy flood. Its shores are famous with the names of Americans, who have dragged its sable headlands and icy bays out of the Arctic fog and night.

From Cape Farewell, its southern extremity, in the same latitude as Christiania, St. Petersburg and Mount St. Elias, to Cape Washington, its northernmost known limit in lat. 83° 38′ N., the distance is fifty miles greater than the extreme width of the United States from the mouth of the Rio Grande to the 49th parallel. It is probable, however, that its northern limit is near to or within the 85th parallel, in which case its extreme length is some 1,739 statute miles, about the same as the air-line distance from Washington to the City of Mexico. From Cape Hatherton, its most westerly, to Cape Bismarck, its most easterly known limit, is 690 miles. Its area is from 740,000 to 750,000 square miles, about the same as that of Mexico, and four times the area of the New England and Middle States. No less than four-fifths of this area, or 600,000 square miles, equivalent to three times the area of France or the German Empire, and thirteen times the area of Pennsylvania, is covered by the inland ice.

The population of the country is about 10,000, of whom between two and three hundred are Europeans, and the Danish Crown supports a fleet of six or eight vessels, and clears some ten thousand dollars annually from the sale of the blubber, eiderdown, ivory and furs obtained in Greenland.

The coast is bold and mountainous, cut by numerous deep fjords, and protected by an advanced guard of outlying rocky islands. Some of these fjords extend inland a distance of sixty or eighty miles, and many of them are the outlets of great glacier streams from the Inland ice.

There is not a bridge nor a road, a carriage, nor a horse, nor a cow, in the country.

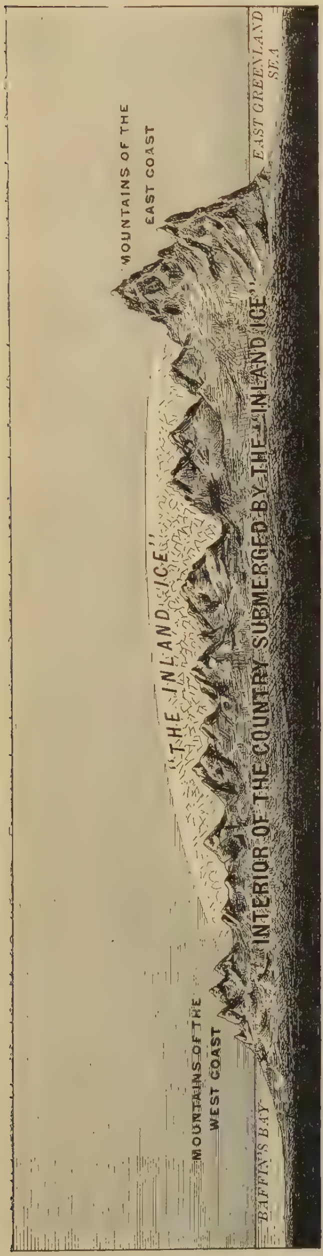
A skin-boat in summer, and a dog-sledge in winter are the sole means of travel. But it is in the character of its interior that Greenland differs from every other known land, and it is in this interior that the chief interest centres.

As far back as 1728 an expedition which attempted to cross from one of the southern settlements on the west coast of Greenland, to the east coast, encountered an impassable ice desert, and during the next one hundred and fifty years it was discovered that throughout the entire known circumference of Greenland there existed, at a distance from the coast varying from ten to eighty miles, an unbroken wall of ice, and enormous glaciers.

As late as 1883, it was believed by some, most prominent among whom was Baron Nordenskiöld, that this icy barrier was comparatively narrow, and that within it lay an ice-free and fertile interior.

His expedition into the interior in 1883 changed his views entirely, and his experiences, together with my own in 1886 farther north, and Dr. Nansen's in 1888 farther south, show conclusively that the entire interior is submerged by ice.

Now picture to yourselves an irregular ribbon of bare


EAST GREENLAND SEA
MOUNTAINS OF THE EAST COAST
"THE INLAND ICE"
INTERIOR OF THE COUNTRY SUBMERGED BY THE "INLAND ICE"
MOUNTAINS OF THE WEST COAST
BAFFIN'S BAY

TRANSVERSE PROFILE OF GREENLAND FROM WEST TO EAST.

ragged mountains, valleys, and branching fjords, covered with snow in winter but free in summer, and rich with greens, and reds and browns, which warm up wonderfully in the brilliant yellow sunlight of the long Arctic day. Then imagine this ribbon surrounding an interior entirely buried in snow and ice, the accumulated precipitation of centuries, not, however, as the Adirondacks or White Mountains might be in the depth of an exceptionally severe winter, but literally submerged till every topographical feature is completely obliterated.

Greenland is in fact but a Titanic mountain dam holding in check a mighty sea of ice. Where there are breaks in the dam, the ice pours through in a resistless glacier torrent and descends to the sea. Where there are shallow notches in the crest of the dam, the ice flows through and hangs suspended in frozen aerial cataracts.

Four years ago last summer, drawn by the loadstone of desire to penetrate this frozen sea, I made a voyage to Greenland, to satisfy myself by personal observation as to the conditions of its unknown interior, and the proper travelling equipment to meet those conditions.

With one companion, dragging our provisions and sleeping gear on sledges, I penetrated over a hundred miles into the great glacial desert, and attained an altitude of 7,500 feet above the sea.

I returned from my tramp on the Inland ice impressed with the idea that the imperial highway of the interior offers to a party of two or three intelligent, resolute men, properly equipped, the means of determining, in the quickest, safest and most economical manner, the northern limit of Greenland and the position and contour of its undiscovered coasts. Every year since has but strengthened me in my convictions.

Now in a few weeks I expect to be on my way to prove or disprove my theories. In outline my project, which has met the approval, not only of the distinguished geographers of the Society, but of other eminent geographical and scientific experts, is as follows:

The party, of five or six, to land in June or early in July, at or near the mouth of Whale Sound.

The remainder of the summer to be spent in putting up a house on the north side of Whale Sound, laying in a store of meat, getting everything in readiness for the winter, making a reconnoissance northward over the "Inland ice" to the southern angle of Humboldt Glacier, and, if the season be favorable, establishing a depot of supplies in the vicinity of the glacier.

The winter to be occupied in making and fitting sledges, clothing, and all travelling equipment, and in snowshoe and "skier" practice, for which the level surface of Inglefield Gulf (head of Whale Sound) is especially adapted.

Early in the spring, four or five of the party to start overland across the "Inland ice" to Humboldt Glacier, with all the sledges and dogs, leaving one man in charge of the house.

If the travelling and the weather be favorable, the sledge party will go on from Humboldt Glacier to the head of Petermann Fjord (90 naut. miles). Here a depot will be established, and two or three of the party, with their dogs and sledges and a full supply of provisions, will proceed; the remaining man or men, with the empty sledges and extra dogs, returning to Whale Sound, where they, with the one left in charge of the house, will utilize their time in hunting for the winter's supply of meat, collecting specimens, making meteorological observations, and surveying.

The sledge party will proceed from the head of Petermann Fjord to the head of Sherard Osborn Fjord (120 naut. miles), establish a depot there, then to the head of Meigs Fjord (110 naut. miles), establish a depot there, thence to the northern terminus of Greenland (100 to 200 miles).

This point reached and determined, the party would retrace its steps to Whale Sound, taking up the various depots, and take the first opportunity to return home.

PERSONNEL OF PARTY.

This to consist of five or six persons, viz.: Chief, Assistant, Doctor, and two or three others; all young, hardy and active.

In Arctic work every increase in the party beyond the number absolutely essential is an element of danger and failure. This essential number (of white men), for a main advance party, may be put at two or three, and for a complete main advance and supporting party at five or six.

The explorations of the Greely Expedition were all made by three-men parties.

Schwatka's great sledge journey was made with a party of four white men.

Payer in his sledge journey in Franz Joseph Land started with a party of seven, but found this number only a hindrance, and, leaving four, pushed ahead with two companions.

Nansen's party numbered six.

My own party only two.

Holm's party to the east coast of Greenland numbered four.

Hall's earlier explorations, and Graah's journey along the east coast of Greenland, are striking examples of the success that may attend the efforts of *one* resolute man in Arctic exploration.

PROVISIONS AND EQUIPMENT.

Provisions and equipment for two years will be selected and designed with the utmost care and judgment that my own experience, combined with several years' careful study of the records of Arctic explorations, will permit.

PRACTICABILITY OF THE PROJECT.

The results of the various attempts to explore inner Greenland, leave little or no room to doubt that the entire interior is completely submerged beneath the accumulated frozen precipitation of ages, which, surrounded and confined by the Titan dam of the coast mountains, forms an immense congealed reservoir, the like of which exists nowhere else upon the globe.

The area of this reservoir is about thirteen times as great as the State of Pennsylvania, and its surface, rising gradually from the edges, attains in the centre an elevation of 9,000 to 10,000 feet above the sea level.

The experiences of those explorers, who have succeeded in penetrating any distance over this frozen sea, show, that while its borders for a width of from ten to forty miles (depending upon the season, the latitude and the elevation), may be of almost impassable roughness, interrupted by huge crevasses, and traversed by rushing glacier rivers, its central portion is covered by a layer of fine dry snow, gradually increasing in depth toward the centre.

To most, if not all previous explorers, this deep dry snow has been a *bête noire*, but I will ask you to accept my statement, which I make as the result of some experience both in boyhood and in later years, that to a properly equipped expert it is the perfection of roads, and offers fewer uncertainties of travel than any other surface known to me.

To a physically perfect, resolute, hardy man, at home on snowshoes and "skier," and specially equipped, this snow covering of the Inland ice presents a field from which almost every one of the elements of uncertainty, that have hitherto made success in Arctic travelling largely a matter of luck, is eliminated.

To keep this paper within as brief limits as possible, I will ask you also to accept my simple statement that, given a choice of latitude, of elevation, or of season, there is no considerable distance along the border of the Inland ice in North Greenland, in which there is not some place, where a party may step from the mountain summits directly upon the dry unbroken snow surface, and advance into the interior, without seeing a crevasse, an ice hummock, or a glacier stream.

The question of practicability then figures down to the average rate of daily advance which may be reasonably counted upon, and the possibility of carrying provisions for the time, which, at such rate of advance, will be consumed in covering the total distance.

From fifteen to twenty miles per day I believe to be a conservative estimate of average daily advance over the "Inland ice."

In 1874 Payer for 27 days averaged 11.85 miles per day, over the ice of the Franz Joseph Fjords.

In 1882 Greely for 12 days averaged 20½ miles per day, in the interior of Grinnell Land.

In 1883 Lockwood for 57 days averaged 18.76 miles per day, along the North Greenland coast.

In 1884 Lockwood for 31 days averaged 14 miles per day, across Grinnell Land. During several marches on a lake, over which the travelling may be considered as almost identical with "Inland ice" travel, he made 21 to 26 miles in 6 to 7½ hours, an average of 3½ miles per hour.

Dr. Rae for 22 days averaged 27.27 miles per day, across the Hudson Bay region.

The average of all these averages is 18.48 miles per day.

So much for speed ; now as to time.

Lockwood's party was out 57 days.

Hayes' party was out 60 days.

The parties of Aldrich and Beaumont were out over 70 days each.

These are the records of travel over rough sea ice, or the broken rocky surface of ice-free Arctic land, and a party on the Inland ice could hardly fail to materially better these results.

Assume the speed, however, to be the same as the above average (18.48 miles per day).

If we suppose the northern terminus of Greenland to be near the intersection of the 85th parallel and the 10th meridian (W. of Greenwich), and I think there is much more probability of its being in a lower rather than a higher latitude, the total distance from the south side of Humboldt Glacier to the terminus, and return, is about 1,064 nautical, or 1,219 statute miles. A simple sum in division gives 66 days as the time required to traverse this distance.

SPECIAL ADVANTAGES.

These are : The possibility of laying a straight course from point to point, with the certainty that no tidal crack or chaos of heaped up ice will compel a long detour, or stop all further advance ; that every foot travelled is a foot advanced, and the comforting assurance that nothing can happen to cut off the retreat.

The even and unvarying character of the surface to be traversed, and the gain in lightness of sledges and equipment, and rapidity of advance, resulting therefrom.

The length of the season (at least six months) during which sledging may be prosecuted.

The facilities that the "Nunataks" or island mountain tops, which in Middle and South Greenland (and also without doubt in North Greenland), project above the "Inland ice" at distances varying from two or three to forty miles from the edge of the ice, offer for forming depots of provisions. Depots placed on these "Nunataks" are safe from the attacks of bears or other animals, and the "Nunatak" itself forms a prominent landmark, by which to recover the depot.

The exceptional value of the elevation of the route in accurately charting the coast and detecting the existence of more northerly land or lands. From the heights of the ice cap, with miles of the coast lying like a map below, as I have seen the entire circuit of Disco Bay, and at another time Noursoak Peninsula, Omenak Fjord, and Svarten Huk Peninsula, the coast can be charted with an accuracy and rapidity unknown to one toiling from headland to headland along the seashore.

The one disadvantage of this route, which, however, it shares with all Arctic routes, lies in the storms, and against the fury of these a pit in the snow affords shelter and is always available.

Once the idea is grasped of exploring Greenland from the *inside*, from the smooth, serene heights of the interior ice, instead of from the outside, through grinding ice fields or along a ragged coast, it will be seen how simple and easy it is.

It is like exploring an atoll around the margin of the placid central lagoon, instead of along the outer shore through reefs and breakers.

RESULTS TO BE ANTICIPATED.

The solution of a geographical problem (viz.: the northern extension of Greenland) second in importance only to the discovery of the North Pole.

The possible discovery of the most practicable route to the Pole.

The certainty of important additions to our knowledge of the geography, geology, glaciation, ethnography, meteorology, and natural history of the Arctic regions.

Let me note the salient points of my project. My base is the one advocated by Kane, Hayes, Hall, the distinguished President of this Society, and almost every American authority on Arctic exploration; a region having a small and kindly native population, with abundance of game, and within easy reach of the whalers which pass Cape York every year, on their way to the fishing grounds in Lancaster Sound and the adjacent waters.

My line of advance is absolutely direct throughout each 100 to 200 mile section. If it were not desirable to touch at the heads of Petermann, Sherard Osborn, and the other principal fjords, which interrupt the Northern Coast, and determine their length and the characteristics of their heads, the line of march might follow very closely the arc of a great circle from the head of Whale Sound to beyond Lockwood's farthest.

The following will, I think, bring home to every one the directness of my proposed route. Lockwood, in attaining his "farthest" from Fort Conger, and return, travelled 1,069¾ (Greely's Report, vol. 1) statute miles. The distance from the head of Whale Sound *via* the Inland ice to the "farthest," and return, is 1,028 statute miles. As to the obstacles and difficulties of travelling on the two routes there is no comparison.

The smallness of the party I also consider a vital element of my project. With the small party, the unbroken snow for a road, the never-to-be-foreseen vagaries of Arctic seas, and Polar ice-floes eliminated, and the entire Arctic summer in which to travel, I believe that all contingencies in my plan are as completely within the scope of experience and careful prevision, as those of a winter journey across our own prairies ; and I am confident that success is almost certain.

Many have spoken to me of the dangers of the trip, my rashness in undertaking it, and the uncertainty of my return.

As a matter of fact I consider that there is no danger whatever in the project.

There are now in Northern Greenland, under climatic conditions and environment similar to those of my proposed headquarters, Danish officers with their wives and families, living the same home life as the better classes here, with their window gardens, their music, their books, and all the other accessories of culture and refinement.

Were it not that the ice makes the navigation of Melville Bay in some seasons uncertain for a sailing vessel, there would be one or more of these families near the proposed site of my headquarters.

The only element of hardship for my party will be the exposure to cold, and for a healthy, well-clothed, and well-fed man, I consider this as nothing more than a physical annoyance, not a danger.

Risks of the sea are eliminated in my project, savages, wild beasts, poisonous reptiles and vermin there are none ; fever and malaria are unknown.

I want you to divest yourselves of the popular conception of the Arctic regions in general and Greenland in particular, as a place where eternal snow, overpowering cold, and Cimmerian darkness hold unbroken sway throughout the year, and where the unavoidable fate of any poor mortal is, sooner or later, to drop into the snow benumbed and starving.

The brilliancy and teeming life of the Arctic summer, during which my work will be done, is equalled nowhere else on the globe, and as for the dangers and hardships of an eighteen months' sojourn, where I propose to go, they are no greater, sentiment and imagination put aside, than in Northern Norway, in Siberia, in the higher Alps, or, to come nearer home, than those experienced every winter by the Dakota and Montana farmers and their families.

R. E. PEARY.

JOURNEYS ON THE INLAND ICE.

The pages that follow, most of them taken, and often in his own words, from Dr. Nansen's "The First Crossing of Greenland," Chapter XVI., are added to give to the readers of Mr. Peary's paper a comprehensive view of what is known concerning the Inland ice of Greenland. The responsibility for this abstract, as well as for the observations and notes which occur in the course of it, is sufficiently indicated by the initials at the close of the paper.

The first suggestion of a journey to the interior of Greenland is found in a letter of instructions written in 1723 by the manager of the Bergen Company to Hans Egede, in these words: "It seems to us quite advisable, if indeed the thing has not been done already, that a party of eight men should be told off to march through the country, which according to the map would appear to be only from eighty to a hundred miles across at its narrowest part, for the purpose of reaching, if it be possible, the east side, where the old colonies have been, and on their way to look out for forests and other things."

Egede thought the scheme was not feasible; but in 1728 positive instructions were sent to Major Claus Enwold Paarss, the first and last titular governor of Greenland, "to spare no labour or pains, and to allow himself to be deterred by no danger or difficulty, but to endeavour by all possible means and by one way or another to cross the country to the aforesaid 'Österbygd' (Eastern Settlement; the old colony) for the purpose of learning whether there still exist descendants of the old Norwegians; what language they speak; whether they are Christians or heathens, as well as what method of government and manner of life prevail among them."

Paarss started on his expedition April 25, 1729, with two officers and five men, and sailed far into Ameralik fiord, where Nansen's overland journey ended in 1888.

The party did not go very far. "After we had marched for two days,"—says Paarss, in his report,—"we came at noon on the third day to theedge of the 'ice mountain'; but when we had ascended this and advanced upon it for two hours at our great peril, all further progress was denied us by reason of the great chasms which we found thereon. . . . As soon as we saw that no further advance was possible, we set ourselves down upon the ice, with our guns fired a Danish salvo of nine shots, and in a glass of spirits drank the health of our gracious King on a spot on which it had never been drunk before, at the same time paying to the 'ice mountain' an honour to which it had never before attained; and after we had sat and rested ourselves for about one hour we turned back again."

Paarss found great stones lying upon the ice, and conceived that they had been carried there by the violent winds. He compares the sharp-edged ice to "white sugar-candy"; and his party returned to Godthaab on the 7th of May, from "this dangerous and very laborious expedition," not wholly without its convivial moments.

It is stated in a book entitled, *Nachrichten von Island, Grönland and Strasse Davis*, published at Hamburg in 1746, that a ship's captain attempted to penetrate into the interior of Greenland by all manner of expedients, employing "even the long footboards which are used, as is well known, by the Lapps and others for their winter traffic. But he failed to penetrate far, and after losing one of his men, who ventured too far on in front and sank into the depths before the eyes of the party, while they heard his shrieks and lamentations, but could not go to his help, he was obliged to turn back without his follower, and without any hope of ever advancing further." Dr. Nansen adds that this passage is interesting not only because it contains the first mention of the use of *ski* upon the Inland ice, but also because it records the only known instance of loss of life on the same ground.

In 1751 Lars Dalager, a merchant of Frederikshaab, made an excursion into the interior. He went out at the end of August, to divert himself with his gun, and "resolved to set out on a journey across the 'ice mountain' to 'Österbygd,' to which determination I was led by a new discovery made in the preceding month of July by a Greenlander who had been so high up while out hunting that he could see distinctly, as he said, the old Kablunak mountains on the eastern side.* This moved me, as I have said, with a desire, at least to see the land, like Moses of old, and I took with me the aforesaid man and his daughter, together with two young Greenlanders. We set out upon our journey after having already advanced thus far into a fjord by the southern side of the glacier (the one known in Greenland and Denmark as 'Fredrikshaabs Isblink')."

The party left the fjord September 2, reached the edge of the ice the next day, and the day after, "in the morning," says Dalager, "we committed ourselves to the ice, purposing to reach the first mountain-top, which lies in the middle of the ice-field and which was five miles distant from us. So far the ground was as flat and smooth as the streets of Copenhagen, and all the difference that I could see was that here it was rather more slippery, but on the other hand one had not to wade out to the sides in the slush in order to avoid being overthrown by the posting-horses and carriages."

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* *Kablunak*, or more correctly *Kavdlunak*, is the Eskimo name for Europeans or now more especially Danes.

They went on to the uppermost mountain, called Omertlok, across ice so rough and full of cracks that the march of five miles consumed seven hours. From the top of the mountain they had a wide view inland, and saw in the distance above the north-east horizon some peaks, which Dalager took to be mountains on the east coast, but which have since been identified as *nunataks* (islands or peaks) lying some twenty miles from the western edge of the ice. They are now known as *Jensen's Nunataks.*

Standing on this summit, "we began," says Dalager, "to fall into admiration at the great prospect in all directions, and above all at the mighty ice field which stretched away up the country and across to the 'Eastern Settlement,' where the mountains like those on which we stood were covered with snow." The party remained on the peak till seven o'clock in the evening, when Dalager "ended the day with an address to the Greenlanders, which treated of the inhabitants of Österbygd in old times and of their physical as well as spiritual welfare. Meanwhile the sun went down and we descended the mountain some way and then laid ourselves down to rest."

The journey was continued no farther, the leader finding himself "constrained for many reasons to set my face towards home, one being very important, that we were now going no better than barefooted. For, though each of us was provided with two pairs of good boots for the journey, yet they were already quite worn out by reason of the sharpness of the stones and ice. And as the handmaid whom we had in our company had, to our great misfortune, lost her needle, we could get none of our things mended. For this cause we were much embarrassed, though we consoled each other with laughter as we contemplated the naked toes peeping out from the boots."

They turned homeward on the 6th of September and on the 8th reached the camping place by the fiord.

"I cannot here forbear to mention," says Dalager, "with what unusual appetite I emptied that evening a whole bottle of Portuguese wine, after which I slept on till the following day at noon."

Dalager believed that the crossing of Greenland was impracticable, not on account of the ice, but because provisions could not be carried and, also, because the cold was too great to be borne for many successive nights. "I can say," he declares, "that of all the bitter winter nights on which I have camped on the ground in Greenland, none have so much distressed me by reason of the cold, as these nights early in the month of September."

Dr. Nansen adds his own testimony to the same effect about the cold of September.

In the last century Fabricius, the naturalist who wrote on the glacial phenomena of Greenland, derived many of his facts from personal observation of the Inland ice.

It was not till the middle of the present century that the attention of the scientific world was drawn to the significance of the Inland ice by the writings of Dr. H. Rink.

He pointed out the enormous magnitude and thickness of the great ice-cap and the fact that Greenland is the only country in the northern hemisphere which supplies the great icebergs of the Arctic and North Atlantic. He has calculated that each of the great fiords must send out into the sea not less than eight or ten million cubic feet of ice every year.

Dr. Rink's studies and explorations showed the necessity of more extensive investigations at the only accessible spot where the glacial forces were now at work on the largest scale, and a new series of attempts to reach the interior of Greenland began about the year 1860, with the Expedition of the *Fox*, under command of Sir Allen Young, to examine into the possibility of carrying a telegraph-cable across Greenland to America.

There seems to have been at one time, according to Dr. Nansen, an idea of landing a sledge expedition, in charge of Dr. John Rae, upon the east coast, with the object of crossing the ice to the west side. Dr. Nansen tells the story in these words :

" The *Fox* reached the southern part of the east coast about the middle of September, and the sledge-party could apparently have been landed here without difficulty. At this point, however, those in charge of the expedition seem to have thought better of the scheme, so the ship went round Cape Farewell to the west coast instead. Here, at the end of October, Dr. Rae made an attempt upon the ice in the neighborhood of the colony of Julianehaab. From the narrative of Lieutenant Zeilau, who accompanied the party for a time, one would gather that the expedition did no more than contemplate the ice from a distance, but from Dr. Rae's own account it appears that he did really set his foot upon the glacier, but was very soon brought up by a 'deep and wide crevasse that effectually stopped further progress.' This, I may perhaps be allowed to say, must have been a remarkable crevasse indeed."

Dr. Nansen takes the quotation concerning the crevasse from the *Proceedings of the Royal Geographical Society*, August, 1889, to which he refers in a foot-note. The account in the *Proceedings* shows that even with the best intentions Dr. Nansen cannot always trust his memory.*

Dr. Isaac I. Hayes made an attempt upon the Inland ice from Port Foulke, in Lat. 78°, 18′ N., in 1860.

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* Sir Allen Young (who commanded the *Fox* in 1860) said : . . . "On September 12th, after passing through 100 miles of ice, they arrived at the coast of Greenland, about 63° N. The sight of the coast was simply appalling, with precipitous peaks and cliffs, and glaciers running down to the sea. He was about one mile off the land, and could have landed a party ; but feeling that he could not keep his ship in her position, he thought it better to report in favor of carrying a cable round the south into one of the western fiords. Afterwards on the western inland ice, he accompanied Dr. Rae for two days, but heavy snow intervened and he had great difficulty in getting back to his ship. That was in the middle of November. He wished to ask Dr. Nansen if he thought it would be possible to land a telegraph cable on the east coast and carry it across to the west coast.

"Dr. Rae begged to express his admiration, and to re-echo the words of previous speakers, at the manner in which Dr. Nansen had carried out the arduous work he had undertaken. . . . . . Regarding the *Fox* Telegraph Expedition, of which Sir Allen Young spoke, and of the overland part of the work, of which he (Dr. Rae) had been placed in charge by Col. Schaffner, the crossing of Greenland, although it was talked of, there was not the slightest intention of its being attempted, not the smallest preparation of any kind having been made for such an arduous piece of work ; and if there had been any such preparation, the lateness of the season (November) would have been a fatal hindrance. All that was desired or expected to be done was accomplished by getting a few miles inland on the glacier, and by reaching a deep and wide crevasse that effectually stopped further progress ; and showing that to bring a telegraph wire across the ice would be very difficult, if not impracticable, and in his (Dr. Rae's) opinion useless."—*Proceedings of the Royal Geographical Society*, 1889, pp. 484–485.

Dr. Rae was followed by Admiral Sir E. Ommanney, and then Dr. Nansen thanked all the speakers for their kind words, and answered the inquiry as to the possibility of laying a cable across the ice ; but he asked no question, when question was so easy, about the "remarkable" crevasse, which has left an aching void in his mind.

The party started October 22, marched about sixty miles and returned after six days, having endured great suffering from the cold. The ice was extremely rough and the snow-crust gave way under the feet, but the distances made were, five miles on the second day, thirty on the third, twenty-five on the fourth, and nearly forty on the fifth, on the return. These measurements, Dr. Nansen rightly thinks, can hardly be accepted.

The next attempt was that made by Mr. E. Whymper, in the summer of 1867, from a little fiord named Ilordlek, to the north of Jakobshavn, and nearly in Lat. 69°. Mr. Whymper reached the Inland ice at about twenty miles north of Jakobshavn, and found the surface smooth and hard for six miles and eminently fitted for dog-sledging.

He turned back, therefore, full of hope that he might succeed in walking right across Greenland. However, as at Ilordlek the ice does not come down to the water's edge, Mr. Whymper determined to look for a spot where he could take to the ice at once, and avoid the transport of his baggage over land. He found no suitable place and had to return to the first spot, where one difficulty after another delayed him for nearly a month.

On the 20th of July the expedition was ready to start. There were six in the party. Two days were spent in carrying the baggage from the fiord to the edge of the ice, and three more in waiting for favorable weather.

When Mr. Whymper came to view the surface, which had been so smooth a month before, he found that the snow had melted away and "had left exposed a veritable ocean of ice, broken up by millions of crevasses of every conceivable form and dimensions." An attempt was made to push over the ice to the eastward, but, after going a distance of two miles with several hours' hard work, two of the sledges were broken and the rest badly shaken, and the party came to a halt. Three men went forward a mile or two to see if the ice improved, but they reported that it was even worse, and Mr. Whymper abandoned his purpose and returned to the fiord.

Three years after Whymper, Baron Nordenskiöld and Prof. Berggren penetrated a considerable distance beyond the outer margin of the Inland ice, and spent several days in succession encamped upon its surface. Accompanied by two Greenlanders, the Swedish explorers, on the 19th of July, 1870, passed the edge of the ice in the northern arm of Aulatsivikfjord, which lies to the south of Egedesminde, or near Lat. 68° 20′ N. Provisions were taken for thirty days, and the whole equipment was to be hauled on a sledge, but the task was too heavy and Nordenskiöld determined, on the second day, to leave the sledge and a portion of the provisions behind. Each man shouldered his load of the remainder, and the party proceeded. July 21, at 1,400 feet above the sea, the Greenlanders refused to go farther, and went home the next day. Nordenskiöld and Berggren continued the journey. On the 22d they were at a point in Lat. 68° 22′ N., and 56 minutes of longitude east of their camp on the fiord, and at an elevation of nearly 2,000 feet.

They spent the night of the 23d in Lat. 68° 22′ and 20 minutes farther to the east than on the previous day, at an elevation of only 1,900 feet. Scarcity of food made it necessary to return, but to obtain a view over the ice field the travellers mounted a ridge. From this point they saw that the plateau continually rose, unbroken by any range of peaks. Their turning-point was 2,200 feet above the sea, and about 83 minutes of longitude, or 35 miles, to the east of the northern arm of Aulatsivikfjord, which they reached July 25, after seven days spent on the Inland ice.

The surface of the ice was either furrowed by deep, and sometimes broad, crevasses, or consisted of ridges and hollows, the former as much as forty feet in height and with sides sloping at angles of from twenty-five to thirty degrees. There were many rapid streams, that flowed in deep channels in the ice and often could not be crossed. These rivers generally ended in great holes, or "glacier-wells," into the dark-blue depths of which they were precipitated in roaring cascades.

At one spot was found a kind of spring or fountain, or intermittent column of water mixed with air, projected upwards. There were many small lakes and pools, and "when one laid the ear down to the ice one heard from all sides a peculiar subterranean murmur from the streams enclosed below, while now and again a single loud cannon-like report announced the formation of some new crevasse."

The weather was bright throughout the journey and the temperature, a little above the ice, rose in the day to 45° or 46° Fahr., and in the sun to 75° or even 85°. After sunset the pools of water froze, and the nights were cold.

It was on this expedition that Nordenskiöld observed and described the "glacial dust" or "cryoconite," a fine grey powder which was found strewn on the surface of the ice, as far as the explorers went. Owing to the absorption of heat from the sun this dust had sunk into the ice and had caused the formation of perpendicular cylindrical holes, one or two feet deep and from two lines to two feet in diameter.

These holes lay so thick that there was often no place between them on which to set the foot. At the bottom of the holes, which were always full of water, the dust lay in a deposit some millimetres in thickness. Nordenskiöld considers that this dust is of cosmic origin, and he believes that the earth is constantly receiving a reinforcement of matter in this shape from the surrounding universe. It has been shown, however, that this powder, in its constitution, has a remarkable resemblance to the materials of the coast mountains; and it is a fact that the quantity of the dust decreases the farther one penetrates towards the interior, while on the east coast by Umivik, where bare land almost disappears, Dr. Nansen found scarcely any dust at all upon the ice.

In 1871 an expedition was sent to the interior by the Inspector of North-West Greenland, but it seems to have accomplished nothing.

In 1872 Mr. Whymper explored the district to the north of Disco Bay and by Umanak Fjord. He made no attempt on the Inland ice, but ascended, on the 18th of August, Kelertingouit, a mountain near Umanak. From the summit, 6,800 feet above the sea, he looked over the plateau and saw "a straight, unbroken crest of snow-covered ice, concealing the land so absolutely that not a single crag appeared above its surface." He measured with a theodolite the angle to the apparent summit of the ridge and found it to be considerably in excess of 10,000 feet.

One of the strongest arguments of those geologists, who still held out against the glacial theory, was that all the glaciers, known and studied in Europe, had too small a rate of progression (two feet in a day) to produce the enormous results attributed to their eroding and quarrying power. Greenland was to furnish an answer to this argument.

In 1875 the Norwegian geologist Amund Helland visited North Greenland, to measure the rate of movement of the glaciers and to see what results they were producing. He examined, during June, July and August, that portion of the coast which lies between Egedesminde, in Lat. 68° 42′ N. and the fiord of Kangerdlugssuak in the Umanak district, near 71° 15′ N., and studied five " ice-fjords " and a number of minor glaciers, as well as Ilordlek Fjord, where the glacier does not reach the sea. He also ascended the Inland ice at about the spot chosen by Whymper.

Helland found that the glacier in Torsukatakfjord had a daily rate of progress of a little more than thirty feet, while the great glacier in the "ice-fjord" of Jakobshavn moved at the rate of sixty-four feet in a day.

It was in 1875 that Dr. Rink suggested the crossing of Greenland by an expedition from the district to the north of Fredrikshaab. He wrote : " I think that it must be done with sledges hauled by men, and that two small ones ought to be constructed in the most careful way and furnished with every necessary. Besides the scientific conductor of the expedition and his assistant, I should say about four Europeans would make the proper complement."

"This idea," says Dr. Nansen, "agrees, as will have been seen, in several particulars with my scheme, but, curiously enough, I had never come across this passage till I returned from Greenland."

In 1876, the Danish Government instituted a series of scientific investigations in Greenland. The results of these investigations, which are still continued, are recorded in the *Meddelelser om Grönland*, a work issued periodically by the Board of Commissioners, charged with the undertaking.

The first expedition, under the geologists Steenstrup and Kornerup and Lieut. G. Holm, was to examine the edge of the ice-field in the district of Julianehaab. It was proposed to go some little distance in to a group of *nunataks*, known as the Jomfruer and marked on the maps of Greenland, in order to see whether that would make a suitable starting-point for a subsequent expedition on a larger scale. The party was stopped at the outset by the general roughness of the ice and the size of the crevasses,* and nothing was done beyond measuring the movement of the ice in three glaciers, the highest rate found being some twelve feet in the twenty-four hours.

An expedition in 1877 to the northern part of Fredrikshaab was defeated by the unsettled weather.

In 1878, Lieut. Jensen, the geologist Kornerup, an architect named Groth and an Eskimo, made their way,

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*Dr. Nansen finds nothing remarkable in these crevasses, though they also were in Julianehaab.

July 3, to the *nunatak* Nasausak, which is 4,700 feet above the sea, and on the south side of the glacier known as Fredrikshaabs Isblink. The condition of the ice being considered unsuitable at this place, an attempt was made from a new starting point, Itivdlek, on the north side of the glacier.

The ice was exceedingly rough and every one in the party, now increased by the addition of four Greenlanders, suffered more or less with snow-blindness.

On the 24th of July they reached the group of *nunataks* which Dalager, in 1751, had taken to be the mountains of the east coast. These *nunataks* were forty-five miles from the starting-point, and about twenty from the nearest point on the margin of the ice-field. On the largest of these peaks, 5,000 feet above the sea, the explorers were detained for a week, by a snow-storm.

Capt. Jensen ascended the peak July 31, and saw the Inland ice rising uninterruptedly towards the east, and ending in a horizon considerably higher than the peak on which he stood. The same day the homeward march was begun, and the camping-place at Itivdlek was reached on the 5th of August. The efforts of the Government have been confined, since 1878, to short journeys to the near-lying *nunataks*, to explorations along the edge of the ice-field and to measurements of the movement of glaciers. Of the results, one of the most noteworthy is the series of observations made by Lieut. C. Ryder, in August, 1886, which established, for the Upernivik glacier in Northern Greenland, a daily advance of no less than one hundred feet.

In 1880 the Swedish geologist Holst ascended the

Inland ice at several points in South Greenland. He found that Nordenskiöld's "glacial dust" was composed of the same substances as the mountains of the coast.

Three years later Nordenskiöld made his second Greenland journey. He had formed a theory that it was a physical impossibility for a large continent, like Greenland, to be entirely covered with a mantle of ice under the climatic conditions which prevail elsewhere upon the globe to the south of Lat. 80° N.

His argument was that for the formation of an ice-field or glacier a certain amount of snow or rainfall is necessary, and that the amount deposited in the interior of Greenland cannot be sufficient for the purpose.

All the air, he considered, which came from the surrounding seas and ought to bring moisture with it, had first to pass the ranges of high mountains which border the coast.

As the air passed up the sides of these mountains it would be cooled, and as it rose it would become expanded through the diminished atmospheric pressure, and thus it would be compelled to deposit most of its moisture on the coasts.

In so doing it would set free its latent heat and grow warmer, and its temperature would rise still higher as it descended on the far side of the mountains and the atmospheric pressure increased. In this case, it would reach the valleys and depressions of the interior in a dry and warm condition, like the Föhn of Switzerland.

Nordenskiöld's purpose, in this second expedition, was to test his theory by pushing across the interior of Greenland to the east coast. He started on the 4th of July from a spot a little to the south of Disco Bay, with a party of ten, two of them Lapps, provided with their *ski*. In eighteen days the party advanced seventy-three miles, and reached an elevation of nearly 5,000 feet. Here the snow was so wet that men and sledges sank into it, and Nordenskiöld found himself compelled to stop; but he sent forward the two Lapps, with instructions, in case they came upon bare ground, to collect specimens of all the plants they found there.

Three days later (July 24) the Lapps returned and reported that they had gone about 145 miles into the interior and had reached a height of 5,850 feet, and that the surface was everywhere an unbroken expanse of snow. Dr. Nansen thinks, with reason, that the Lapps overestimated the distance they had travelled.

One incident of their journey tended to confirm Nordenskiöld's belief in the existence of bare land somewhere to the north. Two ravens had come flying from that quarter, and had turned back as soon as they reached the tracks of the Lapps in the snow; and these birds are not in the habit of straying far, in the summer time, from their nesting-places in the coast mountains.

None the less, Nordenskiöld made up his mind to turn back, and reached his encampment on the 3d of August.

The next expedition was Mr. Peary's, in 1886. He had for a companion Mr. Christian Maigaard, and, for the first few days, the help of two Greenlanders, a man and a woman.

The starting-point was Pakilsokfjord, Lat. 69° 30′ N., and the ascent of the ice began June 28.

The provisions, calculated for thirty days, were hauled, with the baggage, on "two nine-foot sledges, thirteen inches wide, made of hickory, steel and hide, on a modified Hudson Bay pattern, and weighing complete twenty-three pounds each." One pair of *ski* and one pair of Indian snowshoes, each, were taken. There was no tent, but a shelter was made of a tarpaulin and the two sledges. The travelling was done by night and the sleeping by day, and for a time, while the state of the snow permitted, snow huts were built every day.

During the greater part of the journey the temperature was below freezing-point, but on the 9th of July a wind from the south-east raised the mercury to 46° Fahr.

On the 17th Mr. Peary's reckoning of longitude showed that he was about one hundred miles inland from the ice-edge, and at an elevation of 7,525 feet.

A snow storm detained the two explorers till the 19th, when the weather cleared sufficiently to allow of an observation being taken at mid-day.* In the evening they turned back and, with the wind behind them, lashed the two sledges together and rigged up a vessel with alpenstocks for a mast, a tarpaulin for a sail, and a *ski* with an axe attached for a rudder. On this craft they sailed, according to Maigaard's calculations, twenty-seven miles the first night, thirty-two the second, and fifty-four the third. After this they took to hauling, on account of the rough surface. July 24, they reached the camp at the fiord, having spent twenty-three days on the ice.

Dr. Nansen is disposed to doubt Mr. Peary's report. He says: "Unfortunately, Peary's longitude was only based, as it seems, on some observations of altitude taken with the theodolite about noon on July 19. The expression *circum-meridian sights*, which both he and Maigaard use, is not quite clear in itself. These so-called 'simple altitudes' are, besides, notoriously uncertain for longitude reckonings.

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*Mr. Peary says: "Then followed a perfect day (19th) warm, clear, almost calm, enabling me to get a good observation."

"The chronometer, too, had come to a standstill and an ordinary watch, which Peary declares to have been very trustworthy, was used in its place; but, as far as I can see from his account, no observations were taken subsequently by the coast to determine this time-keeper's accuracy. The distance of a hundred miles from the margin of the ice cannot, therefore, be considered as established beyond all doubt. The days' marches, again, which are said by Maigaard to have often been between twelve and eighteen miles, may strike the reader as somewhat long. I know well from my own experience that a great deal of work is necessary to cover so much ground with a heavy sledge in tow, if the gradient be ever so little against one."* He adds, in a footnote:

"It is difficult to say, too, what faith we can place in this elevation of 7,525 feet, as it was only based upon the records of an aneroid barometer. . . . . . Nevertheless, Peary's height does not seem at all too much for

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*The best answer to this remark concerning the rate of progress is Dr. Nansen's description of the surface travelled by Peary and Maigaard: "The ice these two passed over was, with the exception of the first part, very level throughout, and more so even than that which Nordenskiöld had traversed in 1883. There were not many crevasses, and for the greater part of the way the surface was covered with a layer of dry snow, into which, at the extreme point which they reached, Peary could drive his staff six feet deep. This state of things must have made progression very much easier than usual."—*The First Crossing of Greenland*, Vol. 1, p. 505.

the distance from the coast. We were quite as high as this when we were no more than 110 kilomètres, or 68 miles, from the east coast, and 160 kilomètres, or 111 miles, from the west; and I should be inclined to think that the gradient must be about the same between Lat. 69° and 70° N."*

Dr. Nansen's conclusion is, after all objections, that Peary's expedition is one of the most noteworthy that have been recorded in connection with the Inland ice, and that admiration is due to the two travellers who did so much alone, and with such small resources. Mr. Peary and Mr. Maigaard have shown no disposition to over-rate their own performance, and it may be supposed that they will receive, with some measure of calmness, the approbation which Dr. Nansen bestows upon them.

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*Mr. Peary describes his instruments and methods as follows:

"This distance is based on an excellent series of twelve circum-meridian sights at this camp, with the theodolite placed within the walls of our hut to protect it from the wind; a series of ten similar sights at the tent; and time as given by one of the best Elgin watches, carried, during the five days intervening between the observations, in a pocket on the inside of the bosom of my flannel shirt. Having carried the watch two or three years, I know its variation in that time could by no possibility exceed thirty seconds either way. For several reasons no other observations are given.

"In the selection of my instrumental outfit, I had chosen a light traveller's theodolite, as being lighter and more generally useful than a sextant and artificial horizon. But under the conditions of continuous wind and deep snow which I encountered, it was impossible to use the theodolite except by setting it in the compacted bottom of a snow-house after we had slept in it, with the wall of the hut to shield the instrument from the wind.

"In scaling the glacier face, my chronometer had had the usefulness shaken out of it, and after this loss I did not feel disposed to add the labor and discomfort of observations of approximate value only, to the constant and imperative demands of the numerous details, attention to which was the price of our advance. My daily advances were only estimated, and therefore I do not present the distances.

"The elevations are those indicated by one of Keuffell & Esser's best $26 pocket aneroids, with attached thermometer and compass. The ascent on the outward trip, as shown by this barometer, was 7,525 ft., the descent on the return (one hundred and thirty-three hours of continuous fine weather), 7,450 ft. Mean, 7,487 ft., 6 in.

"Temperatures were shown by a Signal Service thermometer."—*Journal of the American Geographical Society*, Vol. xix, p. 276.

The next expedition to the Inland ice, was Dr. Nansen's, in 1888. A Norwegian sealer, the *Jason*, commanded by Moritz Jacobsen, took up the party at Isafjord in Iceland, and set sail on the 4th of June for the east coast of Greenland. There were six in the party; Dr. Nansen, Otto Sverdrup, Oluf Christian Dietrichson, Kristian Kristiansen Trana, and two Lapps, named Samuel Johannesen Balto and Ole Nielsen Ravna. On the 11th of June they sighted the Greenland coast, about sixty miles away. At noon they were in Lat. 65° 18′ N., Long. 34° 10′ W. The coast was lined with ice, drifting with the currents, the floes now opening, now packing close together, and it was not till July 17th that the boats pushed off from the *Jason* in the evening to reach the land across Sermilikfjord. For twelve days they were tossed to and fro and carried along with the drifting ice; and it was not till July 30th that the explorers landed. On the 15th of August, after working up the coast, they started from their camp near Kiatak, for the march over the Inland ice to Christianshaab on the west coast. On the 26th of August they reached the level of the Inland ice at a height of 6,000 feet, after passing through rain and snow storms and fine weather, and crossing a number of crevasses, which lose nothing in the description. The season was so far advanced that Dr. Nansen determined to make Godthaab the objective point, instead of Christianshaab. As the advance continued the level surface rose again and again, but almost insensibly. September 1, the elevation marked by the aneroid barometers, which Dr. Nansen is inclined to distrust, was 7,930 feet. The greatest height reached was 8,970 feet.

At these elevations, the sun's rays produced a powerful effect. A spirit thermometer marked 85° Fahr. in the sun, while the real temperature, as obtained by a sling thermometer, was little more than 25°; and on the 3d of September the spirit thermometer in the sun at noon showed 88°, while the temperature by the sling thermometer was 12° Fahr. Dr. Nansen put a minimum thermometer under his pillow in the night of Sept. 11, and in the morning the spirit was a good way below the scale, which marked—35° Fahr. The calculations made by Professor Mohn, of Christiania, as to the lowest temperatures experienced by Dr. Nansen's party, are largely hypothetical, none of the instruments carried registering below—35° Fahr.

September 20, the country to the south of Godthaabsfjord was in sight from the tent, but there was work to be done before the coast could be reached. As it was neared the climate improved, and there were signs of game, many kinds of birds and reindeer. September 26, thickets of willow and alder were found, the bushes as high as a man, and the alders still green. The thermometer marked 55° Fahr. in the shade in the day-time, and the nights were as mild as September nights in Norway. There was a warm and dry easterly or south-easterly wind, like the Swiss Föhn.

September 29, the clumsy little boat the wanderers had put together was launched on the fiord, and on the 3d of October Nansen and Sverdrup, the advanced guard of the party arrived at Godthaab.

As far as can be seen from his account, no observations were taken by Dr. Nansen by the coast to determine the accuracy of his instruments.

The ascent of the Inland ice began at Umivik, on the east coast, on the 15th August, so that the crossing was accomplished in fifty days, and the distance travelled to Godthaab was about 350 miles.

The expedition was in every way a memorable one, well conceived and carried through with energy and perseverance.

G. C. H.

DR. JOHN RAE'S ARCTIC EXPLORATIONS.

Editor the BULLETIN, American Geographical Society:

Dear Sir: You may have among your collection of English Admiralty charts one dated 1855, having the south shores of Wollaston and Victoria Lands drawn upon it, and also my discovery of Victoria Strait (in which Franklin's ships got ice-bound and were abandoned by their crews in 1848)—on a searching expedition, employed by H. M. Government—myself and my ten or twelve men being, however, of the Hudson's Bay Co.'s Service. I in 1851 searched closely, surveyed and mapped out about 750 miles of the coast above named, about 140 miles of which between longitude 105° and 110° W. had, however, been roughly traced by a previous expedition. The 600 odd miles of my survey—all new ground—were part of that, for which I was awarded in 1852 the Founder's Gold Medal of the Royal Geographical Society of England, in the Journal of which (1852), vol. 22, will be found the record of the award of the medal, the President Sir R. Murchison's speech when presenting it, and my Report and chart of the survey.

Now comes the strange part of the story. Captain Collinson, R. N., in H. M. S. *Enterprise*, had come through Behring Strait, also in search of Franklin, in 1851, and in 1852–53, by ship or sledge, passed along the same coast that I had surveyed a year before, but did not get back to England until late in 1854.

On the 29th of December of that year, I received a letter from Admiral Beaufort—then about to resign his position as Hydrographer of the Admiralty to Captain Washington, R. N.,—of which the following is an accurate copy:

ADMIRALTY, December 29, 1854.

Dear Dr. Rae: I am endeavoring to put into our Arctic chart Captain Collinson's track, and, as far as Cambridge Bay and the Jenny Lind Island (Collinson made Jenny Lind Island part of Victoria Land, although some miles from that shore, with a deep ship channel between. *J. R.*) of your drawing, we get on pretty well by taking his points, and adopting your more minute detail of the shore. But from your Jenny Lind Island up to your Pelly Point, in Latitude 70° 20′ N., I can in no way possible reconcile the apparent configuration of the coast in the two tracings, as you will perceive by the enclosed copies. His Driftwood Point, I suppose to be the eastern end of your Admiralty Island (Yes. *J. R.*), but I know not where to find your broad opening into Albert Edward Bay—can you put me on any scent likely to solve my difficulties?

Yours very truly,
(Signed) F. BEAUFORT."*

I enclose a correct copy of the above named tracings. The Bay referred to, which I surveyed and sounded in my boats, has a coast line of about 200 miles, which Collinson passed and repassed without seeing it! A very short time after this, in January, 1855, a chart of

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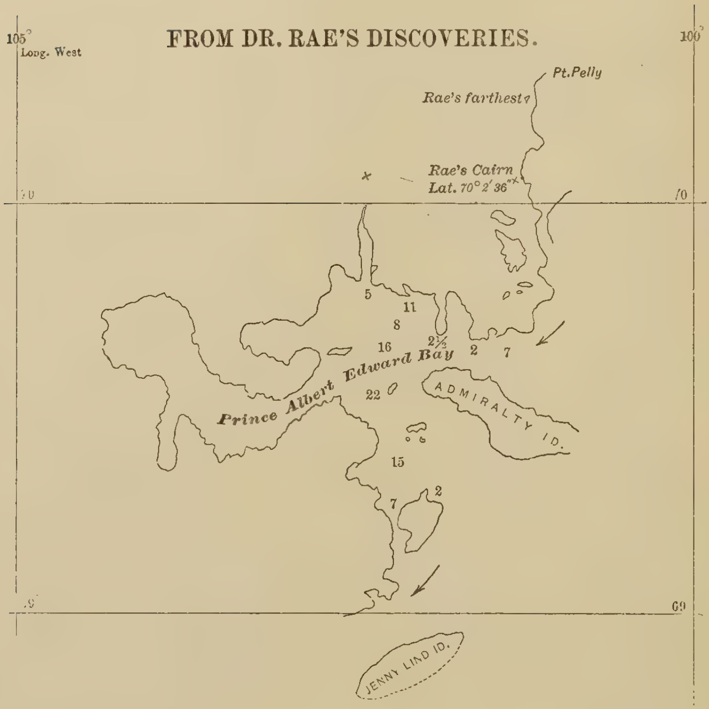
* The only reply given to this note by me, was that Collinson had evidently travelled over the ice far out from the land—although searching for Franklin,—and had not seen the large Bay with 200 miles of Coast. J. RAE.

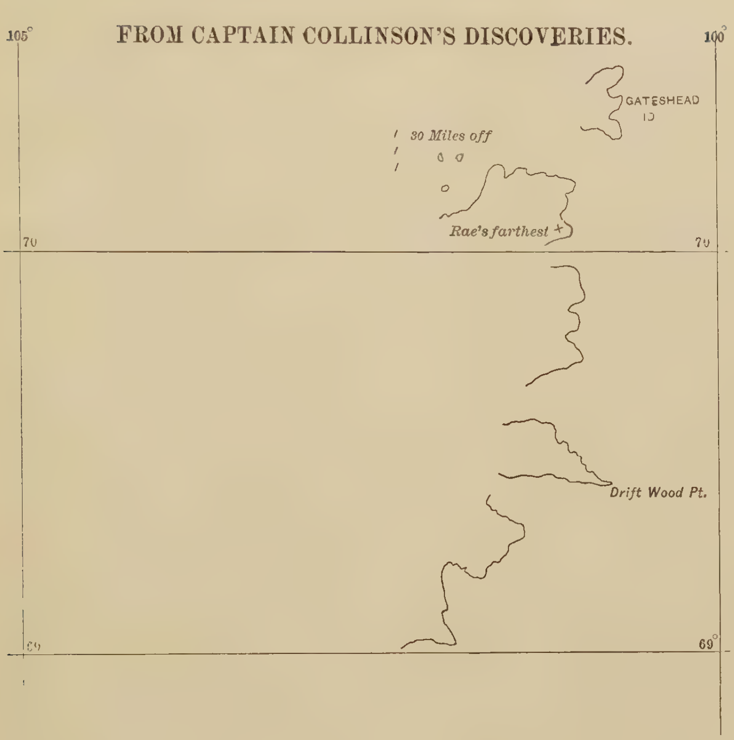


* *Note by Dr. Rae.*—Two of my men went eight or ten miles beyond this point. The land being a dead flat, I saw them with telescope from an ice hummock at least five or six miles out.—J. R.

this coast was sent me by Captain Washington, then Hydrographer, with the following note inserted :

"From Cape Back round this Peninsula to Gateshead Island (my Point Pelly) the outer line of the coast has been determined by Captain Collinson, and the lakes and inner bays (The bay having a coast line of 200 miles being one of these inner bays. *J. R.*) adapted from Dr. Rae."

FROM CAPTAIN COLLINSON'S DISCOVERIES.



Note by Dr. Rae.—My discoveries are cut down to the point where I took my latitude with sextant, 70° 2′ 36″, whereas two of my men, active young fellows, walked at least eight or ten miles farther. The shore being flat as a table, I saw them with my glass five or six miles on their way, I being on an ice-heap fifteen feet high.

Collinson is allowed to put down land seen thirty miles off.—J. R.

For an obvious purpose no dates are given.

When I tell you that nearly the whole of Captain Collinson's chart was exchanged for mine, and errors in one part of even 10 miles of Latitude were corrected, and a chain of islands, 18 miles in extent, of *my survey with* a deep channel inside, made to replace an equal extent of coast of Victoria Land, as Collinson's drawing had it, you may suppose that the arrangement of actually handing over my prior and correct survey (I say *correct*, otherwise it would not have been adopted by the Hydrographer,) to Captain Collinson was not agreeable to me.

Next morning I went, chart in hand, to the Hydrographic Department of the Admiralty, and asked Captain Washington the meaning of the note given above. I found the Captain in a very high and mighty humor, quite quarter-deck fashion, as when speaking to a subordinate, I suppose, when I remonstrated on the injustice done me, winding up with "*No change or alteration can be made.*" It was now my turn, and I had my remedy handy, and said: "Captain Washington, if you have not that objectionable note removed in a week—I give you a week to think it over—the whole disgraceful proceeding shall be published in the *Times* (of which paper my friend Mr. Delane was then Editor). The Captain looked aghast, and remarked: "Would you *dare* do that to the Admiralty?" It was, perhaps, not good manners, but I fairly laughed in his face, saying at the same time, that I had been four years in the service of the Admiralty, and, setting aside the Hydrographic officials, had always found them civil, courteous and *even* kind, but did not fear them. Repeating my threat, I took my leave. Within four days of the above little conversation a copy of the Chart was sent me, with the aforesaid *Note* covered over with thick cartridge paper, and a letter telling me that the same would be done with all the *copies* on hand, and that the note would be omitted in the next edition.

The next edition soon appeared (that is, in the same year), and the note above referred to was left out, having had, as far as I knew, a short life of 5 or 6 days. The Hydrographer, feeling probably a little sore and uncomfortable at being frustrated by a mere civilian, inserted another note, as follows:

"The coast from Cape Back to Gateshead Island was discovered by Dease and Simpson (a Hudson's Bay Company's Expedition) in 1839, by Dr. Rae in 1851, and was passed and re-passed in 1851-52-53 by H. M. S. *Enterprise*, Captain Collinson."

Now, every sentence of the above note, with the exception of the five words referring to myself, is untrue, and, unless we can suppose extreme stupidity and ignorance—*wilfully* so.

FALSEHOOD NO. 1.—Dease and Simpson, indeed, saw and traced roughly about one hundred and forty miles of this coast; the remaining part (more than 600 miles) *was my work,* and, as I have already said, part of my discoveries, for which was awarded me the Founder's Gold Medal in 1852. Besides this, I corrected Dease and Simpson's survey in some important points, where they had not approached the land near enough with their boats to see clearly the outline of the coast.

FALSEHOOD NO. 2.—Neither Captain Collinson, nor his ship the *Enterprise*, was *ever* nearer to any part of the coast named than seventy or eighty miles, in 1851.

FALSEHOOD NO. 3.—The *Enterprise* never in 1852–53 passed and repassed from Cape Back to Gateshead Island. The ship got about half way, as far as Cambridge Bay, where she wintered, Captain Collinson going on to Gateshead Island with a sledging party in the spring, 1853.

The above facts seem almost incredible, but the notes —both entered one after the other in the same *chart* in the same *year*—speak for themselves. Probably you have one or other (perhaps both) of these muddled charts in your Hydrographic offices—the first note being still patched over. This false note (the second one) has had something like thirty-six years of an inning—rather an appropriate sporting word for the occasion,—and perhaps you may, in kindness and fairness of spirit, be inclined to aid in restoring to their proper owner the six hundred miles of survey, of which I have for such a very long period been dishonestly dispossessed.

After writing the above, I called at the Admiralty, and saw the present Hydrographer, Captain Wharton, R. N., who was most courteous and painstaking in looking over the documents I had brought with me to explain my rights. He freely acknowledged them, and said he would rectify the injury that had been done, as far as was in his power.

I may further state that it was only about ten days ago, that I found out that the last note mentioned, giving Dease and Simpson credit for the whole survey, was still inscribed on the Admiralty charts, that are on sale at the present time. My belief was, that on its being pointed out that the note was false, as I *did*, the note had been long ago erased or covered up.

Those who care to do so, especially naval officers, might probably be permitted to see Captain Collinson's original tracing at the Admiralty, or a copy of it at Messrs. Stanford's, Cockspur Street. Let them then compare this with the actual outer line of the coast by me, said in the first note to be Captain Collinson's, and any one, at all conversant with cartography, will at once see what a miserable fiction the whole affair has been.

I beg to subscribe myself

Your obedient servant,

John Rae.

4 Addison Gardens, Kensington,
London, W.
May, 1891.

GEOGRAPHICAL NOTES.

BY

GEO. C. HURLBUT, *Librarian.*

INTERNATIONAL CONGRESS OF AMERICANISTS IN 1892.—The Ninth Meeting of the International Congress of Americanists will be held at the convent of Santa María de la Rábida, in the province of Huelva, Spain, during the week, 1–6 October, 1892, the place having been chosen by the Spanish Government, to which the International Congress, held at Paris in 1890, delegated the responsibility of selection.

Tickets of membership may be had by remitting twelve francs, with the name and address of the sender, to the *Secretario general, Justo Zaragoza, Ministerio de Ultramar, Madrid.*—Each member has the right of admission to the Congress and will receive, free of cost, all its publications.

Manuscripts of authors, who cannot be present at the Congress, must be sent in to the Secretary before August 1, 1892.

The programme (arranged by the Paris Congress) embraces the following divisions and subjects:

HISTORY AND GEOGRAPHY.

1. On the Name "America."

2. Latest Researches on the History and Voyages of Christopher Columbus.

3. Influence of the arrival of the Europeans on the

Organization of the Indian Communities in North America.

4. What modifications did contact with the European produce in the social and political organization of the populations of the Andine region? Density of the population before and after the Spanish Conquest.

5. Taking as terms of comparison the statistics collected by order of the Viceroys, and the latest enumerations made by the Peruvian Government, is it found that the law of gradual diminution of the native population, brought into contact with the whites, applies with equal rigor to Latin and to Anglo-Saxon America?

6. Do the latest discoveries made in the great cemeteries in the caves of the Amazon and the river Tocantins (Marajo islands, etc.), permit us to affirm the existence of a previous race, distinct from the present Indian, with a relatively advanced degree of civilization?

7. Study of cartographic documents, recently brought to light, relating to the discovery of America, and their proper place in the series to which they belong.

ARCHÆOLOGY.

1. Analogies which exist between the pre-Columbian civilizations and those of Asia (China, Japan, Cambodia, Malaysia, Chaldea and Assyria).

2. Statement of the most recent discoveries that have been made under the North American *mounds boulders*,* and the conclusions to be drawn with respect to the civilization of their builders.

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*These two English words, evidently misunderstood and meant for *mound builders*, have somewhat confused the sense of this passage, in the French as well as in the Spanish text.

3. What were the ancient populations of the Isthmus of Panama, to whom we are to refer the ceramic collections now existing at Yale College and the Smithsonian Institution, etc.?

4. What relation do the various potteries of America bear to each other?

ANTHROPOLOGY AND ETHNOGRAPHY.

1. Nomenclature of the peoples and tribes of America before the Conquest—Pre-Columbian ethnographic maps—Ethnic elements of the southern extremity of the American continent.

2. New discoveries relative to the primitive (*quaternary*, according to the French) American man.

3. Do craniological studies permit us to affirm that the present American races existed in America at the quaternary period (diluvium) and that the conformation of the cranium in those races was the same as that of the Indians now existing?

4. What are the first immigrations of foreign races into America, of which we have knowledge?

5. Penetration of African races into America, and especially in the south.

6. Do the Indians of America in general, and particularly those of the north-western coast, possess distinctive characteristics, which indicate affinity with Asiatic peoples?

7. Eskimos and their half-breeds.

8. Funeral rites in America before and after Columbus.

9. Figure-writing in America and its geographical distribution.

10. Ethnographic distribution and territorial pos-

sessions of the aboriginal nations or tribes of America, in the sixteenth century and at the present time.

LINGUISTICS AND PALÆOGRAPHY.

1. Principal linguistic families of the Amazon and Orinoco basins.

2. Differences between the languages of the coasts and those of the mountains, in Peru. Is there any analogy between the former and the tongues of Central America?

3. Do the Quichúa and the Aimará belong to the same family?

4. Do the tongues spoken on the western coast of America present any grammatical affinity with the Polynesian languages?

5. Is the composition by agglutination and the incorporation of the personal pronoun, or the object, common to the majority of the American languages?

6. Origin of the plural terminations in the Nahuatl and related tongues.

7. Persistence of the character and form of dialects in the languages spoken in America (Spanish, English, French, Portuguese and Dutch) by the descendants of the European colonists, according to the provinces from which these came.

8. Study of languages in process of formation in America.

Real Americanists must regret to see the reappearance, in this programme, of a subject which has tried the patience and the courtesy of so many Congresses. For every one who could appreciate the value of historical evidence, there never was anything to be discovered concerning the name of America.

GUANAHANI.—Mr. Antonio Maria Manrique has written a work* on the First Voyage of Columbus and his landfall, which is identified with Watling Island, in the Bahamas.

This identification, first made by Muñoz, the historian of the New World, is now generally accepted by all those who have studied the question, but there are maps and books of reference, which still uphold the popular belief that Cat Island is the Guanahani, to which Columbus gave the name of San Salvador. In one sense, therefore, it may be said that Mr. Manrique proves what is already known; but his independent conclusion, worked out at a distance from authorities† and under great disadvantages, is in every way creditable to him. He establishes each point by comparing and illustrating the narrative of Columbus with the evidence of the chart.

In the chapter on "The Light Seen the Night Before,"‡ he is so far at one with Navarrete that he shows the impossibility of a light on the low-lying island of Guanahani meeting the eye of Columbus, when the *Santa María* was forty-eight miles distant from the shore, but he believes that Columbus did see a light, probably on board the *Pinta*, and naturally referred it to the land, when this was discovered four hours later. The Admiral's conviction on this point was, in his state of mind and under the circumstances, entirely natural;

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* Guanahaní. Investigaciones Histórico-Geográficas sobre el Derrotero de Cristóbal Colón por las Bahamas y Costa de Cuba, que comprenden la situación exacta de la primera tierra descubierta del Nuevo Mundo, por Antonio María Manrique. Arrecife (Canarias), 1890.

† He says, for instance, that he has never seen the *Historia* of Muñoz.

‡ La Luz de la Víspera.

and, rightly considered, it leaves no justification for the severe remark made by Cesáreo Fernández Duro: "Nevertheless, it is painful to record it: Viceroy and Admiral, he exacted also for himself the pitiful sum of money, to which the seaman earnestly laid claim as a help for his poverty, declaring that before any other person he had seen a light, the sure sign of land."*

The very smallness of the pension (10,000 maravedis=$14.70) strengthens the argument of Mr. Manrique on the subject: "To affirm that he had seen the light before any other person was equivalent to declaring that he was, from every possible point of view, the discoverer, the revealer of a new world. To renounce the prize was not simply to give up to another a trifling sum of money; it was, in fact, to resign a glory justly deserved . . . It was to leave the door open for any underhand plot that might be contrived on board the *Pinta*, from which vessel the cry of 'Land!' had first been heard, a plot that would have brought with it the diminution of his prestige as a mariner and, above all, as the commander of the expedition.

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* Sin embargo, sensible es consignarlo: Virey y Almirante, quiso para si también la pequeñísima suma que reclamaba con encarecimiento el marinero como remedio de su pobreza, afirmando que antes que otro alguno había visto él una luz, indicio seguro de la tierra.

Colón y Pinzón. Informe, etc., por el Capitán de Navío Cesáreo Fernández Duro, p. 305. Madrid, 1883. Memorias de la Real Academia de la Historia, Tomo X.

The sum of money was the pension of 10,000 maravedis promised by the sovereigns to the person who first discovered land, an amount too insignificant, even after making allowance for the greater purchasing power of money at the close of the fifteenth century, to have constituted an object in the eyes of Columbus.

The land was first seen by moonlight, at 2 A. M., by a sailor on board the *Pinta*. His name, according to Oviedo, was Rodrigo de Triana; according to the testimony of three persons who had sailed with him, Rodriguez Bermejo, of Seville. Navarrete and Cesáreo Fernández Duro believe that these two names designate the same individual.

. . . A man in his position was bound at every hazard to take care that the crew of the *Pinta* should see Martin Alonso, their captain and fellow countryman, in his true light as nothing more than an officer, who had to receive his orders from Columbus." *Guanahaní, p.* 206.

With all his admiration for Columbus, Mr. Manrique cannot be charged with prejudice against Pinzón, or unfairness towards those who seek to find excuses for that captain's disloyalty to his commander.

Whether Columbus first landed on the island of Cuba at Nipe Bay, according to Navarrete, or at Jibara, if we follow Mr. Manrique, is a question that will have to be settled before any steps are taken to erect a memorial statue on the spot in 1892; and the time is short for a decision. It might be better to raise a monument, if monument is needed, on the highest point of Watling Island.

OCTOBER 12, 1892.—Dr. Edward Everett Hale, on behalf of the American Antiquarian Society, of Worcester, Massachusetts, has made the following suggestion in a letter to the Secretary of the Navy:

"Would it not be possible to detail a vessel, with steam power, which might touch at the point of the first discovery—which Captain Fox has fixed at Attwoods Key—on the morning of the 12th of October, 1892? Then let the officer remain as long as Columbus remained, and let him, from day to day, follow his course, which is given in great detail in the log-book of Columbus, so as to really repeat the voyage from day to day, as Columbus made it. Where Columbus caught a lizard our expedition could catch a lizard; where they caught a turtle, they should try for a turtle; on the day when he met the Cubans smoking they might open a box of Havanas, and in important things or unimportant things, they should follow the detail which he gives of his great adventure."

The Secretary must answer that it would be possible to detail the vessel, with steam power, to go through this performance; but he may well ask why it should be done. If the expedition is proposed in order to prove that Columbus made a voyage to the West Indies, it is, perhaps, unnecessary; and, in any case, the steam power is both an anachronism and an impertinence.

If there is any virtue in repeating details of the voyage, so far as lizards and turtles and cigars are concerned, every other detail must be observed and respected. There must be three vessels, named the *Santa María*, the *Pinta* and the *Niña*, each with her commander and complement of men, properly named, according to the authentic list published by Cesáreo Fernández Duro in his *Colón y Pinzón;* and they must all speak the Spanish of the year 1492, the Admiral with his Genoese accent and idiom, and every other man with the right flavor of dialect that belongs to him. No one detail of dress, or ideas, or rigging, or armament may be neglected; for men and the doings of men are not less important than turtles and lizards. So far as the published extract from his letter shows, Dr. Hale claims for himself the suggestion of the voyage in 1892. It may be his; but in 1889, not long after the *Real Academia de la Historia* had printed its programme of an International Competition to celebrate the discovery of America, it was announced in the telegraphic news from Europe that the proposition had been made in Spain to equip and send out three vessels from Palos, in 1892, to sail over the track of Columbus in his first voyage.

Whether the Spanish or the American expedition would result in anything, may be doubted. We know the general course that Columbus steered and we know that he reached the Bahama Islands; but we do not know what allowance to make for the errors due to the imperfection of his instruments, and the problem of his landfall is a problem that cannot be solved. Captain Fox is satisfied that Atwoods Key is the true Guanahani; other authorities, no less competent, prefer Watling Island. Even if this point were decided by general agreement, it would not have been proved, and a new discussion would begin with each successive point; and the literature of mere discussion concerning the discovery of America is already a weariness to the flesh and to the spirit.

RECENT CHARTS OF THE U. S. HYDROGRAPHIC OFFICE.

Pilot Charts of the North Atlantic, January-June, 1891.

No. 1102.—East Coast of Newfoundland: Cape Bonavista to Cape St. Mary.

No. 1239.—Gulf of Mexico: Campeche Bank, Obispo Shoals, E. and S. Triangles.

No. 1240.—Gulf of Mexico: Campeche Bank, Alacran Reef.

No. 1241.—Bahamas: Egg Islands to Eleuthera Island.

No. 1242.—Japan: Island of Nippon, Yokohama Bay.

No. 1243.—China Sea: Singapore Strait, Singapore Roads.

No. 1244.—Hawaiian Islands: Harbors of Maui.
No. 1245.—West Indies: Island of Curaçao, Spanish Water, Spanish Haven and Caracas Bay.
No. 1246.—West Coast of Africa: Cape Juby to Cape Cantin, with Madeira and the Canaries.
No. 1247.—North America: United States and Canada, Passamaquoddy Bay and Approaches.
No. 1248.—Marshall Islands: Ebon Atoll, Arno Atoll.
No. 1249.—Chile: Mejillones del Sur Bay, Angamos Point and San Luciano Anchorages.
No. 1250.—Guatemala: Port Livingston, Gulf of Honduras.
No. 1251.—Hawaiian Islands: Harbors of Kauai.
No. 1252.—Hawaiian Islands: Harbors of Oahu.
No. 1253.—South America, West Coast: Harbors, Coast of Chile.
No. 1254.—China Sea: Hongkong Harbor.
No. 1255.—China: Wusung River, Shanghai Harbor.
No. 1256.—China Sea: Formosa, Kelung Harbor.
No. 1257.—Hawaiian Islands: Harbors of Hawaii.
No. 1259.—South America: West Coast, Harbors on the Coast of Chile.
No. 1261.—West Indies: Island of Saint Lucia.
No 1263.—Korea: South Coast, Crichton Group—Paön Do Monocacy Anchorage.
No. 1264.—Hawaiian Islands: Oahu, Port Waianae.

The Foundation of New York.—The *Compte Rendu* of the Paris Société de Géographie, No. 11, for 1891, announces on p. 278 that it has received from Mr. P.-Th. Virlet d'Aoust a note on the history of the foundation of New York City in 1623, by a colony fo

Flemings, Walloons and *Avesnois*, and presumably, therefore, more or less French.

This note is to appear in the *Compte Rendu*, No. 12, and may surprise the persons, who have been led to believe that the city of New York was, in fact, founded by the Dutch in the year 1612, or thereabouts. It is never too late to learn, and Mr. Virlet d'Aoust's Flemings must have been remarkable men. To found a city eleven years after its foundation is a feat that equals, if it does not surpass, the celebrated capture of Holland by the Dutch.

It is just possible, however, that 1623 is a misprint for 1263.

RECESSION OF NIAGARA FALLS.—Mr. John Bogart, State Engineer and Surveyor, in his Report, addressed under date of December 2, 1890, to Hon. Andrew H. Green, President of the Commissioners of the State Reservation at Niagara, presents what he believes to be a substantially correct statement of the mean annual recession of the Falls.

The earliest record available for accurate comparison is that of the survey made in 1842, under the direction of Prof. James Hall, State Geologist.

Comparing this with the survey of 1890, it appears that there has been a yearly recession, at the American Fall, of $7\frac{68}{10}$ inches, and, at the Canadian, or Horse-Shoe Fall, a yearly recession of 2 feet $2\frac{16}{00}$ inches. The American Fall has receded in the 48 years $30\frac{75}{10}$ feet, and the Canadian Fall, in the same time, $104\frac{51}{100}$ feet.

In 1842, the length of the crest line of the American Fall was 1080 feet. It is now 1060 feet.

The crest line of the Canadian Fall was, in 1842, 2260 feet, and in 1890, 3010 feet.

The area of the rock, which has disappeared in the 48 years, is, for the American Fall 32,900 square feet; and for the Canadian, 275,400 square feet.

THE NATIONAL GEOGRAPHIC SOCIETY announces a change in the publication of its organ, the *National Geographic Magazine*, which will hereafter be brought out in the form of a series of brochures, each issued as promptly as possible after reception of the material. These brochures will be arranged for gathering into volumes, each comprising the issue of a calendar year, with title-page, list of contents and index, and an abstract of the Society's proceedings, together with lists of officers and members, and a copy of the by-laws and rules.

The Society was organized in January, 1888, and now has an active membership of about four hundred.

GOLDTHWAITE'S GEOGRAPHICAL MAGAZINE. — This monthly publication, begun with the year 1891, sustains the promise of its first number, and may be considered a permanent addition to the resources available for geographical education. It is well printed and well illustrated and it furnishes, under the skilful management of its editor, Mr. Cyrus C. Adams, accurate and entertaining information.

It was an act of faith in Messrs. Goldthwaite to venture upon such an enterprise, and it is satisfactory to note that, although the magazine has passed into the hands of other publishers, it will continue to bear the name of its founders.

PROF. HEILPRIN'S MEASUREMENTS OF HEIGHT.—Dr. H. Wichmann writes, in *Petermanns Mitteilungen*, 37 *Band*, p. 104, that cartographers and authors of geographical text-books will do well, for the present, not to adopt Prof. Angelo Heilprin's altitudes of certain Mexican volcanoes, but to retain the older calculations as more worthy of confidence.

A communication from Prof. Hann informs Dr. Wichmann that Heilprin's results were obtained from a single reading, in each case, of an aneroid barometer, which may, or may not, have been corrected; and this had undergone, on the Peak of Orizaba, an alteration which Heilprin himself estimated at .1 of an inch. His measurements may be about 200 feet out of the way.

It is unaccountable, adds Dr. Wichmann, that Heilprin did not improve the opportunity to have his instruments corrected, before and after each ascent, at the Observatory in Mexico; but it does not appear whether the neglect to do this is matter of record, or a mere surmise on the part of Dr. Wichmann's correspondent.

On the 8th of January, 1890, shortly before Heilprin's visit, Ixtaccihuatl, previously looked upon as unconquered, was ascended by the German envoy in Mexico, Baron v. Zedtwitz, in company with the American Consul; but they found, when they reached the summit, that a Mr. Salis had accomplished the feat a few days before them. Baron v. Zedtwitz calls the ascent of Ixtaccihuatl a "real glacier climb," that of Popocatepetl a "toilsome march in the snow."

THE VOLCANO OF POÁS.—Mr. H. Pittier, who is in charge of the *Instituto Físico-Geográfico Nacional* at

San José, Costa Rica, devoted several days (26–31 August) last year to an examination of the volcano of Poás, which is about 19 miles to the north-west of San José.

Poás belongs to the category of complex volcanoes, formed by successive elevations, each simultaneously producing a new crater. Of the three craters now existing, one, apparently the oldest, is near the top of the mountain, at an elevation of 8,400 feet, and only 250 feet below the very summit.

This crater is now filled with water, and forms a beautiful lake about 1,500 feet in diameter. Many of the streams that supply the lake have a sulphurous character, but the water is pleasant to the taste and its temperature varies between 52° and 55° Fahr. There is almost no change in the level of the lake from one season to another, and its surplus waters pass off through the river Angel, at the extreme north-western point of the basin.

The second crater has been almost completely obliterated by the formation of the third, the actual vent of the mountain.

This crater, which lies between the first and the second and a little to the west, is an extremely deep cavity, with walls everywhere perpendicular, except at two points which allow of a descent to the bottom. The gases, continually escaping from below, have acted on the surface of the rocks that form the wall so that it is not easy to identify them, but Mr. Pittier secured specimens of gypsum, pumice, tufa and volcanic sand. The clefts in the wall of the crater were filled with veins of sulphur, and masses of this substance were seen on every side. At the very bottom was a lake, 250 feet in diameter.

Frantzius, in 1861, found the temperature of the water in this lake to be 102° Fahr., and Mr. Pittier records a maximum temperature of 180°. The mean level of the lake was 7,470 feet above the sea. Ravines descend on all sides of the crater with a direction toward the centre. The largest are on the southern side, where the walls are highest, and they are cut in the heaps of *débris* at the foot of the rocks, forming beds for the occasional torrents that come down from above. The results of the active erosion caused by these torrents are heaped up in cones on the edge of the lake, or spread out like little beaches. Thread-like streams of water, clear, but with a taste of sulphur, are found in some of these ravines, and are, probably, the only feeders of the lake.

To the south-west, there is in the wall of the crater a wide opening, the threshold of which is at a height of 360 feet above the water; and, on the east, at about two-thirds of its height, the wall broadens into a terrace in the form of a half-moon.

The warm water of the lake is discolored and dirty-looking, and it is saturated with sulphuric acid, generated, apparently, as Daubrée thinks, by the decomposition of sulphates in the heated waters. There is a continual ebullition of gases, and Mr. Pittier has verified in the steam that rises the presence of sulphurous anhydrid and carbonic acid, the usual gaseous products of volcanoes in process of extinction.

At intervals not yet exactly determined a sudden agitation manifests itself at a point near the northern shore of the lake, and gradually increases until there is thrown up an immense column of muddy black water, which falls back heavily into the pit. This sudden fall produces a dashing of waves, and the lake seems to be tossed by a furious tempest. The spectacle is made more impressive by the sound of the waves, lapping on the rocks at the edge of the lake, with the repetition of the thousand echoes that take it up. Then the vapors, condensing rapidly, form a dazzling white veil, that hides the dark abyss, and rises in shining columns to a height of many hundred feet. Little by little quiet is restored, the winds dissipate the vapors and the crater resumes its ordinary aspect, until another eruption succeeds. The clouds of vapor caused by these explosions are seen from San José, as well as from many other distant places.

Mr. Pittier's explanation of this phenomenon is that the water and the mud of the lake sink to the volcanic centre, where the temperature is extremely high, and the constantly increasing pressure of the resulting gases brings on the explosion.

In his first exploration, made in July, 1888, Mr. Pittier had observed that the bed of the river Angel was separated by no great distance from the edge of the crater, and it occurred to him that there might be reason to apprehend the irruption of the waters of the upper lake into the crater lake. He was led to make a thorough investigation of this matter by a report that the river was already discharging into the crater, and that there was, morever, direct filtration from the upper into the lower body of water.

Careful measurements, executed with the assistance of Mr. Menardo Reyes, established the fact that there was no filtration, and that Mr. Pittier's estimate of about 250 or 300 feet for the distance between the river Angel and the crater was rather below the truth. Adding to this distance the thickness of the terrace with its talus, and the barrier between the river and the terrace, the wall of division between the river and the crater must be at least 800 feet in breadth.

THE EXPLORATION OF THE PILCOMAYO.—According to *Petermanns Mitteilungen*, 37 *Band*, p. 104, the expedition on the Pilcomayo River has had an unfortunate issue. Captain Page, of the Argentine Navy, known for his work on the Bermejo River in 1885, started in April, 1890, in the little steamer *General Paz*, on a voyage up the Pilcomayo in the hope of establishing the long-sought direct communication with Bolivia. The diminishing depth of the river compelled him to abandon the steamer for the steam-launch *Bolivia*, built in Scotland for navigating shallow streams, and in this he ascended as far as the Paliño Swamp, 150 leagues (391 miles) from the mouth of the river. In the numerous canals of the swamp the channel was missed, and the provisions gave out, so that Captain Page had to send some of his men back in a small boat to procure supplies. Before help came, Captain Page died; his companions, his son Nelson and the English zoologist Graham Kerr, continued the voyage.

MR. H. W. SETON-KARR'S MAP OF THE CHILCAT COUNTRY.—A GEOGRAPHICAL NOTE in the BULLETIN for March reproduced some of Dr. Aurel Krause's remarks on the resemblance between his brother's Map of the

Chilcat Country (1883) and the one published by Mr. H. W. Seton-Karr in the *Proceedings* of the Royal Geographical Society for February, 1891. Mr. Seton-Karr makes the following statement, in a letter dated May 1:

"The basis of the small map, in the February number of the *Proceedings* of the Royal Geographical Society, to illustrate the account I gave of my comparatively insignificant journey in British Columbia and Alaska last summer, was not the chart made by Dr. Krause. This I have never seen, moreover, I do not understand German and have never had the pleasure of reading his account of his journey up the Chilcat Valley and back (made ten years ago), which I am informed is published in the Berlin *Zeitschrift* for 1883, nor did I know until after my return that he had ever been there, nor am I aware of any account of his journey in the English language.

"The only map furnished by me as a copy to the draughtsman of the Society or used by him was the latest and best procurable of that region, and to which I had added my route and corrections, published by the Geological Survey of Canada, and entitled 'Yukon District and northern part of British Columbia, Annual Report, 1887, Part B,' by Geo. M. Dawson, D.S., F. G. S., in the construction of which Dr. Krause's chart of this particular river, which I never pretended to have discovered, as well as the work of many other surveyors, of whose names I am as ignorant as I was of Dr. Krause's, have rightly been incorporated. I obtained the name (Klaheena) of one of the tributary rivers from the Indians, and did not manufacture this name out of Dr. Krause's Tlehini, as the writer insinuates, not having seen his account, and no name being given on the map above referred to.

"I learned from Dr. Dawson that Krause's map was pretty accurate, but that the Chilcat and other valleys were probably shown too wide, and judging by the slight differences I found between my observations and the details which I assume were taken by Dr. Dawson from Krause, I think I did the latter perfect justice, without prejudice, in calling his map 'fairly accurate.'"

THE PARIS SOCIÉTÉ DE GÉOGRAPHIE.—At the meeting of the Paris Geographical Society, on the 17th of April, the President, M. de Quatrefages, sketched the history of the Society, from its feeble beginning in 1821 to its present eminence as the greater parent of a great progeny.

When established in 1821, the *Société* numbered 217 members. One of these, M. Vivien de Saint-Martin, now an Honorary President of the Society, has survived all his contemporaries.

Like every similar society, that of Paris has had its periods of adversity. The membership declined in 1830, and the Revolution of 1848, when there were only 101 names on the roll, seemed to foretell the end; but no one lost heart, and courage found its reward. A steady upward movement began, with the presidency of M. de Chasseloup, in 1864, and in 1881, when death removed its President, Adm. La Roncière le Noury, the Society counted 2,108 members. Four years later, under the presidency of M. de Lesseps, the membership had increased to 2,504, the highest figure yet attained. The slight falling off within the succeeding five years has no significance, and even if the Society fails to increase its number to 4,000 members, as M. de Quatrefages thinks it may, it has passed, so far as anything human can pass, beyond the reach of accident.

It must be regretted that one passage of the President's address is strangely unjust to three Societies, which have reason to be proud of their history. M. de Quatrefages says: " . . . . Everywhere, in both worlds, the example set by France was followed. Berlin (1828), London (1830), and St. Petersburg (1845), were the first to imitate us." *Société de Géographie, Compte Rendu, 1891, Nos. 9 et 10, p. 249.*

So far as Berlin and London are concerned, this is correctly stated; but after the London Society come the Frankfurt *Verein für Geographie und Statistik* (founded in 1836), the *Instituto Historico e Geographico do Brazil* (founded at Rio de Janeiro in 1838), and the *Sociedad Mexicana de Geografía* (founded at Mexico in 1839); and then the St. Petersburg Society (1845).

THE WORD "STEPPE."—*La Géographie* (No. 123, 1891), discusses the question whether the word *steppe* should have the masculine or the feminine article in French, and remarks that usage is in favor of the feminine, in spite of Littré, who quotes Lévesque, Chateaubriand, and Victor Hugo. The word is in the plural in all the quotations, and the decision of gender rests with Chateaubriand, who alone gives a qualifying masculine adjective, *verdoyants.*

Between the authority of Littré and the predominant usage *La Géographie* remains in doubt, not being able to appeal to the Russians for the extraordinary reason that "they have no article, and say neither *le* nor *la*."

This denial of the Russian right to grammatical gender for the want of an article is enough to make a despot weep, and it seems fair to ask whether *La Géographie* has ever heard of a tongue, known to some men as Latin. The word *step'* (steppe) is feminine in Russian and in most of the languages which have adopted it.

THE EXPLOSION IN ROME.—Mr. Rodolfo Lanciani, in a letter to the London *Athenæum* of May 23, describes the effect of the great explosion in the powder magazine at Rome on the 23d of April:

"One of the most serious casualties has been in the Church of S. Sabina, on the Aventine, where the doors carved in cedar or cypress wood, a work of the fifth century, unique in its kind, have been wrecked. The panels, representing scenes of the Old and New Testament in a style bearing a strong resemblance to the diptychs of the decadence, are all safe, but the framework has sustained serious injuries. The doors are broken in fourteen pieces.

"One of the frescoes of Bonfigli in the Conservatori Palace has also been injured, a piece three feet square having been detached from the wall. In the Church of the Aracoeli a glass window has been shot against the side wall of the Chapel of S. Bernardino da Siena, scratching slightly one of the admirable frescoes of Pinturicchio.

"In the basilica of S. Paolo fuori le Mura the stained-glass windows with full-length figures of apostles and saints, have all been blown to atoms. They represent a loss of 6,000 *l.*

The stained-glass windows on the stairs of the Vatican Palace, in the apse of St. Peter's, and in the Church of S. Maria sopra Minerva, have met with the same fate.

These last, at all events, are only pecuniary losses, the windows being of modern and not always successful work. The only good specimens of ancient painted glass in Rome—the windows of Claude and Guillaume de Marseille in the choir of S. Maria del Popolo, executed by order of Julius II., and representing events in the life of the Virgin Mary—have sustained no injury. The prompt and energetic action taken in this unlucky event by our Minister of Public Instruction, Senatore Pasquale Villari, gives us the security that not only the damage will be soon repaired, but that we shall be protected from the repetition of such appalling calamities.

"As students of physics and meteorology seldom have the opportunity of experimenting with 265,000 kilos (584,219 lbs.) of gunpowder, it may interest your readers to know what results have been gathered by men of science from this colossal blast. A kilo of gunpowder is said to develop in exploding 216 litres (228 qts. U. S.) of gas; therefore 57,000,000 litres (60,192,000 qts. U. S.) were developed from the Polveriera di Vigna Pia. The power of this mass of gas was such that it could have raised to the height of 450 mètres (1,476 feet) a weight of 117,000 tons.

"Although the powder magazine was located in a hollow between the hills of Vigna Pia, Monte Verde, and Pozzo Pantaleo, and the main force of the explosions was thus directed upwards, the pressure of the air has been felt equal everywhere—on the tops of the Gianicolo as well as in the deep recesses of the Tre Fontane—and it has acted with equal energy on flat and vertical surfaces. Gates, secured with heavy bolts and doubled with sheets of brass or iron, have been blown open in the Lateran and at S. Saba; and the same effect has been felt even in shut and covered places. Thus, at S. Paolo fuori le Mura, the pressure of the air penetrating through the gaps of the broken windows was strong enough to break into splinters the heavy glass doors of the four chapels of the transept.

"The action of the blast manifested itself in two ways—by an earthquake and by an air-wave. The vibratory movement of the earth travelled with greater velocity than the air-wave; so much so that the shock was felt in the city and the suburbs several seconds before the report was heard. Flower-pots, *bibelots*, lamps, and bottles were upset in closed rooms protected from any inrush of air.

"The blast set the barometrical column in violent motion, beginning with a pressure wave of 204 kilos (450 lbs.) per square mètre ($1\frac{1}{5}$ square yards) followed by a counter wave of suction. The first was marked by an increase of 14 millimètres in the barometer, the second by a decrease of $14 + 11 = 25$ millimètres. The power of suction of this last wave was such that ·90 per cent. of the windows have been blown not inwards, but outwards, the fall of broken glass in the streets wounding some three hundred passers-by. The movement in the barometric column lasted sixty-six seconds. It is believed that one-third only of that prodigious mass of gunpowder had time to ignite; the greater portion was blown up bodily, its explosion taking place gradually. Granules of powder have been collected as far as Ponte Milvio. I myself found a charred piece of an ammunition box in a field two and a half kilomètres (1½ miles) from the Vigna Pia. The report was heard and registered not only at Subiaco, Viterbo and Anagni, but also at Caserta, Ischia, and Pesaro, at a distance of more than two hundred miles."

The site of the powder magazine was on the right bank of the Tiber, just beyond the wall of Aurelian; about 1,000 feet to the east of the Villa Sciarra, and a mile and a third in a southeasterly direction from St. Peter's.

EXPLORATION OF THE BLACK SEA.—The Russian Government carried out, in the summer of 1890, a scientific examination of the Black Sea, with the following results:

The mean depth was 6,004 feet, the minimum (600 feet) being in the north-west, bounded by a line drawn from Varna to Eupatoria, and the maximum (7,366 feet) in the sea between the Crimea and Anatolia. The temperature of the surface water was 72° Fahr. in the middle of the basin, and from 75° to 77° to the west and to the east. At a depth of from 30 to 174 feet, the temperature sank to 55° on the south side, to 53° in the centre, and to 52° in the east, west and north. At 180 feet the temperature is only 45°; below that point it rises and at 6,004 feet it is above 48°. In other seas situated under medium latitudes, the temperature decreases with the depth or remains invariable after reaching a certain point, as in the Mediterranean, which has a temperature of 55°.

At a depth of 450 feet, in the Black Sea, sulphuretted hydrogen is met with, and this is found in such quantity at 938 feet that animal life ceases. At this depth there were found semifossil shells and a few mollusks. Only one-thousandth part of the water of the Black Sea is received through the Bosporus.

INCREASING SHALLOWNESS OF THE VOLGA.—The *Bulletin* of the Société Royale Belge de Géographie, 1891, No. 1, quotes from the *Novosti* the observations made by Prof. Issaief during a recent trip on the Volga. He found that the Kostroma forests had been replaced, for a length of 100 miles, by a scanty brushwood and that the formerly impenetrable woods of the Unja had disappeared.

This destruction is the work of the boatmen on the rivers, who find the wood ready to hand for fuel, and much cheaper than coal. Their depredations have been carried on with impunity, in the absence of legislation for the protection of the forests, and the result is that the country along the Volga and its affluents has, in many places, been entirely stripped of timber. Where the banks are high and rocky, navigation is still unimpeded; but where the land is low and sandy, the bed of the river is rapidly filling, and unless measures are adopted for replanting the woods, the Volga will cease to be a navigable stream.

A FRESH-WATER LAKE NEAR THE ARAL SEA.—M. Ed. Blanc, in a communication to the Paris *Société de Géographie* (*Compte Rendu*, 1891, No. 6), mentions the discovery by Col. Koslofski of a lake, hitherto unknown, to the south-west of the Aral Sea, where the maps formerly represented the Gulf of Aibugir.

In the Russian expedition against Khiva in 1872–73, one of the *corps d'armée*, marching by the west and south-west of the Sea of Aral, passed directly across the position assigned to this body of water, without finding a trace of it; and thereafter the Gulf of Aibugir disappeared from the maps. The surveys of Col. Koslofski show that the gulf, when it was in existence (as lately as the year 1854) could not have had the outline indicated on Khanikof's map; and it is strange enough that the present lake is filled with fresh water.

This fact disposes of the suggestion sometimes made that, under certain conditions, there may be a temporary communication of the lake with the Aral Sea.

The lake has no outlet, and its continued existence in a region where evaporation is so powerful and so rapid does not seem to be entirely explained by the flow of water, supplied to it by a stream from the north-east, fed by the drainage filtered from marshes formed by the overflow of the Amu-Daria.

The basin of the lake may have had its origin in one of several causes. It may have been a part of the original basin of the Aral, and have been isolated by the progressive aridity so general in this portion of Asia; or it may be the result of a geological change, which has raised or depressed the level of the country. The primitive slope of the ground was uniform towards the north, and the waters must have followed this inclination towards the Aral Sea, carrying with them the salt held in solution.

If then, the southern end of the original gulf, which forms the present basin of the lake, underwent a geological depression, making it lower than the surrounding region, the overflow of the Oxus in time of freshet, and the drainage of the marshes, would have found their way into it. Another, and perhaps the simplest, theory of the formation of the Aibugir is that which supposes that, during a great freshet, a branch of the Oxus (Amu-Daria) may have poured into the Gulf of Aibugir, driving the salt water before it into the Aral, while the earth and the silt, borne down to the sea by the main branches of the river, heaped themselves into banks to the right and to the left of the mouth, and created a bar across the gulf at a level above that of the water at its ordinary stage. When the inundation subsided, the bar would remain, and the gulf that had been would have been changed into the lake.

THE BENUÉ AND THE KIBBÉ.—*Nature* of May 14 reports Maj. Claude M. Macdonald's account, read to the Royal Geographical Society, of his journey up the Benué and its northern tributary, the Kibbé, in 1889. Maj. Macdonald is the first explorer of the Kibbé and made his start on the 21st August.

It has been believed that a connection existed between Lake Chad (Tchad) and the Benué, by the overflow of the Shari on one side and the Kibbé on the other.

At its mouth the Kibbé is 250 yards wide and from 10 to 12 feet deep, in the summer, the season of high water. For the first five or six miles the country was flat and well wooded, and patches of cultivation were then to be seen. After two hours' steaming Dinghi, a Fulbe village, was passed. The people, who had never before seen a white man, shouted out friendly salutations. August 22, the *Benué* anchored off a large village on the left bank. The people who came down, most of them women, were of the purest-bred Fulbe, and the best looking Maj. Macdonald had seen in Equatorial Africa, east or west.

Their features approached the European and their expression was gentle and modest, though full of vivacity.

The village, named Pamu, was governed by an Emir, who was under the jurisdiction of the Emir of Vola. Every yard of ground was cultivated, and an active barter was carried on with the greatest good temper on both sides.

Soon after leaving Pamu, the steamer reached a deserted country, fifteen miles in length, the barrier between the Mohammedan and the Pagan tribes. The ground was undulating, with isolated hills, and well wooded. The river, 100 yards wide, was dotted with grassy islands and was shallow in some places. It narrowed the next day, and made a sharp bend to the eastward to grassy mountains, with a higher range left to the north. Cultivated patches could be seen, and the main valley stretched back three or four miles; but there was no village. Soon, however, down the winding path came a line of warriors, 200 in number, some with a cloth around the waist, but more without any clothing.

All were armed with spears, three to a man. The steamer anchored about fifteen yards from the bank, and the warriors took to cover behind the boulders and tufts of grass; and a parley began.

When assured that the white men were not Mohammedans, the natives, who were the outposts of the Pagan tribes, said they lived in a village named Katsho, back among the hills, and, after some persuasion, two of them boarded the *Benué.* They prostrated themselves on reaching the deck; and when they returned to the land the crowd had increased in number.

"The scenery," says Major Macdonald, "was now very picturesque; to our right, *i. e.*, the south of the river, some few yards from the water's edge, the mountains rose in some places quite abruptly. These mountains were for the most part covered with green wavy grass, very pleasant to the eye. One or two streams trickled down the mountain side, forming now and again picturesque waterfalls. The river had suddenly broadened out to a lake, or more properly speaking, marsh, some three miles long by two wide. The range of grassy mountains I have mentioned ran along the southern shores of the lake and terminated with it. The country on the east and north shores of the lake, as far as the eye could see in the direction of the Tuburi marsh (near the Shari River) was open and gently undulating, while from the western shores of the lake the beautiful range of mountains, with their needle-shaped peaks, stretched back apparently for many miles. In the north-east corner of the lake we saw a very large village some two miles distant; this we afterwards ascertained was Bifaré. The channel of the river evidently followed the base of the southern hills."

The steamer proceeded and came to a large village, in which the mud huts were built in clusters; and there were hamlets on the slopes of the hill above. The chief of the village said the place was called Kaku, and the name of the big water was Nabaret.

The people of the district have cattle, but no horses; and their food is chiefly dhurra and fish. They hunt the hippopotamus.

Major Macdonald took a guide on board and tried to make for Bifaré, on the north-east shore of the lake, and about two miles from Kaku. After going 100 yards, the water shoaled, and the steamer was put about for an opening in the high dhurra, which grew in "immense quantities." Through this opening the channel was found once more, but only 8 yards wide, and 2½ feet deep, and with a swift current. The boat kept on for about a mile between banks covered with dhurra 8 feet high, but had then to retreat and float backwards for a half-mile, the stream being too narrow to turn in, and not more than 2 feet deep. The farthest point reached was a mile and a half from Kaku and thirty miles from Dawa, in the Tuburi country, the place at which Dr. Vogel stopped in 1854, and the farthest point reached by any European entering Africa from the north.

This expedition seems to have established the fact that there is no connection between the Benué and the Shari.

EASTERN EGYPT.—The London *Athenæum*, of May 23, has information from Mr. E. A. Floyer, now engaged in the exploration of the country between the Nile and the Red Sea.

Mr. Floyer left Assuán in February, with the intention of marching east to Berenice, passing by the well of Abraka, which was marked on a route survey, of which he had a copy. After two days spent in ascending a ravine, and three or four more in trying to find his way across a plain of Nubian sandstone, he reached Abraka, on the 19th, in Lat. 23° 29′ 51″ N., and Long. 34° 47′ E.

About 8 miles to the south was a rock fountain at the foot of a cliff 1,200 to 1,500 feet in height, on the north side of the Wádi Háshim. Here was a valley full of flowers. North of Abraka, says Mr. Floyer, "the crystalline rocks intrude through the sandstone and nummulitic plain which is superimposed, and in the south. . . . the crystalline rocks running more easterly break off the edge of the plateau and leave a rugged line of jagged edges, along which are the mines and quarries of the ancients." Some quartz cones were "perfectly symmetrical, 300 ft. high, 120 ft. diameter at top, and descending with almost artificial regularity to the base—solid quartz, tinged a lovely pink with iron oxide."

The temple at Berenice is built of coarse coral rock and the wall surfaces are scaled off.

The character of the surrounding ruins was that of barracks and forwarding stations for the mines in the interior. On the 16th of March, Mr. Floyer wrote from the Wells of Abu Had as follows:

The mountains to the west of Berenice are drained by the Wadi Kharīt, which joins the Wadi Gharāra, which falls into the Nile near Darāwi. The catchment basin of the Gharāra extends north and south from 23° 30′ to 24° 30′, but the great body of water passes north-east by the Wadi Le*h*ma and the Wadi Jemāl. The latter is a fine, well-treed *wádi*, and apparently curves into the mountains from the north-west. Judging from the driftwood, it carried down during the last rain a body of water half a mile wide, and too deep to be passed by a man on foot.

Mr. Floyer offers, with great diffidence, some arguments antagonistic to the theory of a former pluvial epoch. In some cases the *wádi* bed, from a width of a mile, contracts suddenly to a width of sixty yards, but the sides are not eroded. Further, where a depth of water of three feet instead of two feet would have changed the course, the course has remained unchanged; and, still further, the gneous pebbles are carried by the stream little farther towards the sea than similar pebbles have slid down the talus.

About 20 miles north of Berenice the Wadi Haratreit cuts a path twenty feet deep from the hills to the sea, through vertical schists, granite, schistose with igneous veins and low mounds of recent sandstone. There was a fine grove of Avicennia, some trees measuring four and a half feet round the bole. The coloring of the granites was varied, grey, blue and sage-green, buff and bright green, the last a handsome stone.

The people of the country, the Ababde, were very helpful to Mr. Floyer. He divides them into two classes; the wilder, light-colored men, who rarely quit the mountains, and the darker-skinned men who live in the Nile valley, or near it.

"The former," he says "are much like human gazelles. I met one old man, a veritable Orozembo, with his two children. These were beautiful creatures, coats like satin and large, lustrous, timid, soulless eyes just like those of a gazelle. They are dignified, courteous, and they may know a great deal. But they are inarticulate, and the traveller passes them by as he does the gazelle.

"The darker villagers are intelligent and docile people, not energetic and much at the mercy of the gombeen man or Government Sheikh, who lives on the river, and is sometimes a descendant of old-time Báshibazuk and Mamluk garrisons of Upper Egypt. . . . They have a name for every plant and tree. . . . Most of their mountains are called after some plant, though I have rarely found the plant on the hill named after it. They have five names for hills. . . . Only 'mountains,' *i. e.*, *jebel*, have *wádis*, and it is for this reason that a description of the country should retain the name *wádi* as distinct from the valley. . . . The Abade—the plural is Ababde— . . . when taken to the top of a high hill will name all the places in view. . . . He knows and rarely mistakes granite, sandstone, mica, quartz, and schist. . . . Moving up north along the grey granite belt, we crossed the Wadi Jemal, and reached the ancient mining town of Sakait. Here we saw at a glance that there was many days' work before we could open our lips—temples cut in the rock with Greek inscriptions, tantalizingly partly legible, mountains of shining talc and chlorite, and veins of soft rock of the texture of asbestos, which last we found, by the way, further south ; magazines, mines, long galleries stiflingly hot, and a host of things requiring long and patient examination."

Berenice, founded by Ptolemy Philadelphus, stood on a narrow rim of shore between the mountains and the Red Sea. The "Temple" referred to stood in the middle of the city. It was dedicated to Serapis, and it bears among the inscriptions on its walls the hieroglyphic names of Tiberius and Trajan. The ruins of this city have been visited and described by Cailliaud, Belzoni, Wilkinson and others; and in 1873 Col. Purdy, of the Egyptian army, made a plan of the port and the ancient city, and afterwards surveyed, with the aid of Col. Colston, the country between Berenice and Berber.

THE CONGO FREE STATE.—Col. Geo. W. Williams has brought out three pamphlets* on the Congo State, dated, respectively, July 16, 1890, July 18, 1890, and October 14, 1890. The first and the third arraign the administration of the Free State for nearly every fault and every weakness with which a government can be charged; and on p. 2. of the "Open Letter," it is declared that "a list of competent and veracious witnesses, documents, letters, official records and data has been faithfully prepared, which will be deposited with her Britannic Majesty's Secretary of State for Foreign Affairs, until such time as an International Commission can be created with power to send for persons and papers, to administer oaths, and attest the truth or falsity of these charges."

The charges are twelve in number: that the government is deficient in moral, military and financial strength;

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* I.—An Open Letter to His Serene Majesty Leopold II, King of the Belgians and Sovereign of the Independent State of Congo, by Colonel the Honorable Geo. W. Williams, of the United States of America.

II.—A Report on the Proposed Congo Railway, by Colonel the Honorable Geo. W. Williams, of the United States of America.

III.—A Report upon the Congo State and Country to the President of the Republic of the United States of America, by Colonel the Honorable Geo. W. Williams.

that the posts established are in charge of Zanzibaris, who abuse their power; that the Government violates the contracts made with its soldiers, mechanics and workmen; that the Courts are abortive, unjust, partial, and delinquent; that the Government is excessively cruel to its prisoners; that women are imported and hired out by the State to the highest bidder; that the State engages in trade, in competition with commercial houses; that the Government permits and itself prosecutes the slave-trade; that the Government wages war upon the natives in order to secure slaves and women; that the Government is engaged in the slave-trade, wholesale and retail; that the Government has made a contract with the Arab governor at Stanley Falls for the establishment of a line of military posts from the Seventh Cataract to Lake Tanganyika, "territory," (says Col. Williams) "to which your Majesty has no more legal claim than I have to be Commander-in-Chief of the Belgian army"; and that the agents of the Government have misrepresented the Congo country and the Congo railway.

There is nothing incredible in these accusations, but Col. Williams cannot look for an expression of opinion concerning them until he has produced his evidence; and he does not strengthen his case by his manifest prejudice against Stanley.

DWARF RACES OF AFRICA.—A correspondent sends to the *Bulletin* of the Société Royale Belge de Géographie, No. 2, 1891, some extracts from a paper by Dr. Oscar Lenz on the African Pygmies.

Dr. Lenz has arrived at the conclusion that the Bushmen of South Africa are a branch of the Central African dwarfs, and that a distinct, aboriginal race long ago inhabited the vast forests that stretch from the banks of the Congo to the Lake Region. This race was probably persecuted and scattered in various directions by more active and powerful tribes of negroes. "It seems to me," says Dr. Lenz, "that it is now proved that certain tropical regions of the vast black continent are inhabited by a race of men smaller than the negroes; and that these diminutive people belong to a degenerate family, which also presents all the characteristics of a degraded race, scattered far and wide in groups of a few hundred individuals, like the gipsies in Europe, without settled abodes, and wandering through the impenetrable forests between the Congo and the Lakes."

He thinks it is incorrect to denominate these people *dwarfs*, because the word implies a certain deformity of structure, while the African Pygmies are in fact, well proportioned. Dr. Lenz presents the following table of comparative statures:

	Feet.	In.	Feet.	In.
Patagonians	5	10	5	11
Swabians (S. Germans)	5	10½		
Kaffirs	5	10½		
Polynesians	5	10½		
Don Cossacks	5	8		
Englishmen	5	6	5	7
Austrian Germans	5	5	5	7
Negroes	5	5	5	6
Frenchmen (North)	5	5		
Bavarians	5	4½		
Frenchmen (South)	5	4½		
Chinese	5	4½		
Australians	5	3¾		
Amboynese	5	2½		
Timorese	5	2½		

	Feet.	In.	Feet.	In.
Malays	5	1¾		
Andamanese	5	1½		
Akkas (Schweinfurth)	4	11		
Laplanders	4	6¼	4	11
Anbongos (Du Chaillu)	4	3	4	11
Bushmen	4	3	4	6
Eskimos	4	3		
Pygmies, men (Stanley)	4	3	4	8
Pygmies, women (Stanley)	3	3	4	1

The Bayagas, on the Ogowe River, described by Paul Crampel (*Compte Rendu, Soc. de Géog., Paris, 1890, p. 552*), measured 4 feet 7 inches.

West Central Australia.—A paper in Part I, Vol. VIII, *Transactions* of the Royal Geographical Society of Australasia (Victorian Branch), describes Mr. W. H. Tietkins's explorations in the country to the west and north of Lake Amadeus, in the south-western corner of Alexandra Land. The expedition under the command of Mr. Tietkins was the second sent out by the Central Australian Exploring and Prospecting Association, and started from Alice Springs Telegraph Station, March 14, 1889, with twelve camels, and four months provisions for the party of five.

The course was along the north side of the Macdonnell Ranges for 90 miles to Glen Helen Station. Northward from the Macdonnell Ranges lies a broad plateau known as the Burt plain. It is well grassed and lightly timbered near the Range with *Bloodwood Mulga* and *Grevillea*, and there were also some well-grown orange trees, on which the fruit was parched by the summer heat to the size of a hen's egg. Here also grows the Bean tree or cork-wood (*Erythrina*

Vespertilis,) which attains a diameter of eight or nine inches, with a barrel, (trunk) sometimes of ten feet. The wood is white and very light, (11½ lbs. per cubic foot) and it may be pierced all over with nails without splitting.

The first day's march was to Painta Spring, where the camels were watered. The next water was found on the fifth day, when the beasts were already becoming distressed. From this spring two days' journey brought the party to a break in the range, and the line of march was changed to the south, and the watershed was crossed at eight miles distance. The aspect of the country changed. There was more grass land, and there were indications of a clay subsoil. Crows and kangaroos were seen. The hills were low and stony, and the water channels in the wide valleys trended to the south. Haast's Bluff, known to the natives as Nyurla, was here in sight. It is a range of 2,000 feet in elevation. Glen Helen Station, on the Davenport Creek and about three miles south of Mt. Razorback (1,831 feet high), was reached on the 1st of April. Six miles to the east of Glen Helen is Mt. Sonder, 2,495 feet high, and at its base, where Mr. Tietkins encamped for some days, is a stream, which appears to be one of the sources of the river Finke.

Mr. M'Donald, of Glen Helen, gave the native names of some points, as follows:

Mt. Sonder	*Oorich-ip-ma*	(2d syllable accented.)
Mt. Giles	*Umbat-Thera*	(" ")
Mt. Razorback	*Ooratunda*	(3d " ")
Mt. Zeil	*Wallatrika*	(2d " ")
Redbank Creek	*Oorachilpilla*	(3d " ")

Mr. Tietkins remarks that *Oora* is the native word for *fire*, but that he saw no traces of volcanic rock, or eruptive force. It does not occur to him that *oora* may mean in these names *red*, the color of fire.

He left his camp April 15th, for the unknown west and arrived in ten days at Glen Edith, where he found but three days' supply of water, and set out, with three fast camels, to the southwest, to look for more. When he encamped for the night, twenty miles away, a rain began that lasted four days and five nights.

Glen Edith was discovered by Giles in 1873, and was visited the next year by a party under Mr. Gosse. Mr. Giles marked a tree *Glen Edith*, and the characters were almost illegible. Mr. Gosse had cut GOS, in letters five inches long, on a white gum, and the growth of wood had almost covered the inscription. This overgrowth was cut away, and the letters appeared.

Glen Edith was left May 10th. Next day three of the camels were found to be suffering from the effects of poison; and camp was pitched on a little stream in the Watson Range. From this point the course was west and north-west, over sand-hills covered with *spinifex*, or sand-grass, the hills here, as elsewhere during the journey, being of sandstone. The most northerly point reached was in the range named by Mr. Tietkins *Kintore*, after the Governor of South Australia. The highest peaks, 1,500 feet above the surrounding country, were named Mt. Leisler and Mt. Strickland; and a cairn was erected on the former. Dry as the country was, Mr. Tietkins sprinkled it freely with names.

From Mt. Leisler he saw to the south-west a lake, which he called *Macdonald*, and his next move was towards it. The north shore was tunnelled in every direction by small black ants.

The water of the lake was salt, and the growth on its shores was spinifex and a salt bush, and in some places oak trees. It took three days' travel to reach the western end of the lake, in about 128° 15′ E. Long., 23° 30′ S. Lat. A range of hills forty miles further west received the name of Baron Ferdinand von Mueller, and then Mr. Tietkins turned eastward to complete the circuit of the lake, to which he gives an extent of 15 miles from east to west, and 10 or 12 miles from north to south.

From this point he followed a direction to the Davenport Hills and thence towards Lake Amadeus, of which, however, he saw nothing until he had climbed the low hills, to which he has given the name of *Long's Range.* From these hills he saw Lake Amadeus extending indefinitely towards the east. He concludes, without having approached its shore, that the lake is a long, narrow channel without any stream of importance running into it from any direction. His homeward route led past Mt. Olga to Mt. Connor, where he turned to the north and then to the east, through a most pleasing pastoral country, entirely unlike the sandy region previously traversed.

Mr. Tietkins was able to map an area of about 14,000 square miles.

British New Guinea.—In Part II, Vol. VIII, of the *Transactions* of the Royal Geographical Society of Australasia (Victorian Branch), Mr. T. H. Hatton-

Richards, Private Secretary to Sir William MacGregor, describes some of his travels in New Guinea in company with his chief, who is sketched with a few happy strokes: "Sir William MacGregor inspires mixed feelings of gratitude and confidence. To the dark man he is an object of daring courage and firm, but silent will. I fear I have often failed in my admiration of the merciful consideration which he evinced towards the angry native, and the patient firmness with which our expeditions were carried out."

Mr. Hatton-Richards is less than just to himself, for his hearers were all impressed by his noble sentiments, and his praise of Sir William.

The travels began in September, 1889, at Cloudy Bay, where the natives looked on the white men with suspicion and, when they had gathered their forces, made an attack "with wonderful skill." The fire-arms put them to flight, with a loss of ten men, killed and wounded.

The expedition was weakened by fever, Sir William MacGregor alone, of 25 men, successfully defying it, and Mr. Hatton-Richards condemns the Cloudy Bay district as unfit for European settlement.

A more important exploration was made in November, 1889—March, 1890, in the Western Division of the Colony. The ascent of the Fly River was part of the plan, and on the 21st November the *Merrie England*, which conveyed the party, anchored at the mouth of the river, near Kiwai Island, where some days were spent. Kiwai is 36 miles long, 2½ miles wide, and only about four feet above high-water. It has a population of about five thousand. Tree Island, marked on the charts to the south-east of Kiwai, is not to be found.

The *Merrie England* drew 14 feet and the channel became too shallow, after she had ascended the river for 51 miles; so that the voyage was continued in the launch *Ruby*, 550 miles farther. Descending the river to the sea, the party coasted to the south-west, visiting the islands of Saibai and Dauan, where the people live in terror of a piratical tribe, the Tugere, who come from the west. Beyond the Mai Kussa River these people were met with, powerful men, and by far the finest race, Mr. Hatton-Richards says, that he has seen in New Guinea. Their only weapons were bows and arrows, and their canoes were clumsy and had no outriggers. The poles, with which the canoes were propelled, were made of the pedestal of the Sago palm leaf.

An observation showed that the explorers were in Dutch Territory, and they accordingly took their leave of the Tugere. On the return voyage a new river was discovered, in Lat. 9° 10′ S., and Long. 141° 25′ E. At the entrance the river was 200 yards wide and from four to five fathoms deep.

It was ascended for 120 miles, at which point it had narrowed to 15 yards and was obstructed by snags, but the depth of water was three fathoms. The course was very winding and the low banks were overgrown, principally with mangroves; and alligators abounded.

This river, which has since been named by Sir William MacGregor the "Morehead," is the only stream within British territory to the west of the Fly, where fresh water can be obtained, near the coast.

Mr. Hatton-Richards makes some just remarks in conclusion on the right of the natives in New Guinea to fair and honorable treatment at the hands of the white man, duly provided, no doubt, with fire-arms.

THE TANNA VOLCANO IN THE NEW HEBRIDES.—In an address before the Victorian Branch of the Royal Geographical Society of Australasia, in November last, Mr. J. W. Lindt described his visit to the New Hebrides in July, 1890. On the way he touched at Noumea, in New Caledonia, which reminded him of the Southern Italian cities, with houses embowered in orange groves ; and the natural beauty of the harbor and surrounding country seemed to him second only to that of Sydney. There was but little cultivation around the town, and the farms were more neglected than those of France.

When he arrived at Tanna the volcano was in eruption, with heavy explosions every few minutes, and roars to which the discharge of great guns bore no comparison. Masses of scoriæ were thrown up, and even in daylight the dense, black vapor that followed each outbreak reflected the fire raging in the mountain. The savages came down to the beach to meet Mr. Lindt's party. They are described as the ugliest crowd ever seen, the expression of their faces rendered ferocious with streaks of red and black paint, their manner bold and inquisitive, and their dress disgusting. Their hair was arranged in hundreds of small tufts, six or eight inches long and wound about with thread to within an inch from the tip, which formed a brush. Four of these men were engaged as carriers, and a start was made for the mountain. The road led into a thicket of cotton-wood and then for a mile through a forest, where Mr. Lindt saw for the first time the New Hebrides banyan tree, with its enormous trunk and masses of aerial roots. All kinds of ferns and orchids thrive on the bark and among the limbs of this banyan, and it is the home of the pigeon and the Siviri or New Hebrides parrot, and the only tree-snake found in the islands lives in its twisted roots.

Beyond the forest was a stretch of sand, and here a shallow lake reflected the cone of the mountain above it. Though the volcano is but 1,150 feet in height, the ascent was difficult, the incline being nowhere less than 40 degrees, and often much more, and the slope covered with scoriæ and sharp-edged masses of obsidian. The vapors that rose with the unceasing explosions had the smell of steam from freshly slaked lime. Arrived at the edge, says Mr. Lindt, "We all gazed awe-struck at the fiery cauldron below. As near as we could judge, the circumference of the crater edge measured from between two and a half to three miles, but there was what might be termed a saddle, which divided the cauldron into two *unequal halves*." A shameful abuse of power, even for a volcano; but Mr. Lindt goes on: "The larger and more active half was right beneath us, and the smaller basin formed the eastern boundary. On our right, more than 300 feet sheer below us, was a lake of liquid fire, frothing and seething. Every few minutes before an eruption took place the surface of this lake would smoothen like a mirror. Then by degrees the whole face of it would assume a spherical shape, until the pent-up gases below burst the gigantic bubble with irresistible force."

Grouped around the lake were five funnel-shaped pits, varying between 40 and 120 feet in diameter. From the smaller ones red-hot lava rose unceasingly in jets and columns ; the larger threw out tremendous discharges of lava and scoriæ to a height of 800 or 1,000 feet.

Mr. Lindt's measurement of the volcano—1,150 feet—was accepted and confirmed by Captain Davies, of H. M. S. *Royalist ;* and the height of 600 feet, set down on the chart, appears to be an error.

SWEDISH-AUSTRALASIAN ANTARCTIC EXPLORATION.—Baron Oscar Dickson's offer to defray half the cost of an expedition to the South Polar region under the command of Nordenskiöld, if Australia raised the other half—£5,000—was heartily accepted by the Australasian Scientific Societies last autumn.

It is more easy to begin than to finish such explorations, but there is little doubt that the year 1892 will add memorable contributions to the knowledge of the polar regions, Northern as well as Southern ; and the Australians must look upon this first enterprise as the assertion of their duty and their claim to explore the Antarctic seas as their own peculiar province.

Ten Years in Equatoria and the Return with Emin Pasha, by Major Gaetano Casati.

Translated from the original Italian Manuscript by the Hon. Mrs. J. Randolph Clay, assisted by Mr. I. Walter Savage Landor. With upwards of One Hundred and Fifty Illustrations, Colored Plates, and Four Maps.

2 *vols. 8vo.* *London and New York*, 1891.

The preface, which is written by Capt. Manfredo Camperio, gives two reasons for the tardy appearance of this work; the first, that the author's early papers were stolen by King Chua, and the notes they contained had to be written from memory. Brief as it is, Capt. Camperio's preface might be cut down. The praise of Maj. Casati's modesty is out of place in the introduction to his own book, and one sentence* in the work itself could not well be surpassed for boldness by any person of a retiring nature.

The explorer appears to be, none the less, a conscientious and truthful writer, and this integrity of character gives value to the record of his African experience, though the narrative is strangely deficient in charm, even for those who have not lost their interest in the Dark Continent. The book is ill-arranged, and the story rambles back and forth in a confusing manner.

The loss of the notes accounts for much of this confusion, but more is due to the want of a sense of proportion, and Casati is less than just to his own achievements as an explorer.

He deserves also very great credit for his entire freedom from jealousy, his generosity and unselfishness, and his fairness to every man, friend or foe.

In his account of the Return, there is not a trace of exaggeration. Stanley and Emin, the principal figures, are drawn, so to speak, in outline and without attempt at relief or shadow. The rescue and the rebellion are not much more intelligible than they were before Casati wrote, but he has told all he knew, and probably

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*"It was a Calvary, but I did not hesitate to ascend it."—*Ten Years in Equatoria, vol. 1, p. 335.*

A similar expression is found in vol. 2, p. 105.

all that ever will be known, about the fall of Emin's government.

The illustrations are like the epigrams of Martial—some good, some not so good, and more of them bad; and the work has suffered in every way by the effort to meet a supposed demand for two volumes.

Longmans' New Atlas, Political and Physical, for the use of Schools and Private Persons. Consisting of 40 Quarto and 16 Octavo Maps and Diagrams, besides Insets and 16 Quarto Plates of Views, etc. Engraved and Lithographed by Edward Stanford. Edited by Geo. G. Chisholm, M. A., B. Sc., Fellow of the Royal Geographical and Statistical Societies.
4to. *London and New York, 1889.*

This Atlas deserves the praise bestowed upon it when it first appeared as "very superior to any of its class yet published in this country" (England); and the comparison may be extended to include the United States.

The physical maps (those confined, that is, to presentation of the physical features alone) are particularly good and clear, with very little of the crowding, hardly to be avoided in the treatment of some subjects, such as the oceanic currents and mountain systems, where these are complicated.

The British Islands naturally receive a great deal of attention, but not more than is demanded in a school Atlas; and the physical maps of England and Wales and Scotland are especially to be commended.

In all the maps the 100 fathom line on the coasts is marked by an uncolored space, and this device, if not entirely pleasing at first, has very decided advantages.

The plates, which present types of the races, characteristic scenes in nature and social life, products of the vegetable kingdom, etc., may have their use, but they seem to be out of place.

OBITUARY.

Antonio F. F. da Silva Porto.—The *Gazette du Portugal,* of April 16, from which is taken the portrait here reproduced, describes at length the military and other ceremonies which attended the reception and transfer of Silva Porto's body from the African steamer at Lisbon, to the railway, and the burial at Oporto.

The manner of the explorer's death stirred the national feeling.

It is told that he brooded over the humiliation of his native land by Great Britain, and put an end to his life in a moment of despair.

Silva Porto's name has been familiar for many years to the readers of books of African travel. He was born in 1817 at Oporto, and grew up, almost without education, to the age of twelve years, when he went to seek his fortune in Brazil. After six or eight years' struggle in that country, he passed into Africa and found his way to the District of Bihé, then governed by Maj. Coimbra.

In the absence of the governor Silva Porto administered the district for a year with great energy and integrity, and it was after his representations that the military occupation was decided upon, in 1850. He crossed the continent from Benguela to the mouth of the Rovuma River and back, in the years 1853–56, and visited in his trading expeditions, and explored, a great part of South Central Africa.

The African life seems to have fascinated him, as it did Livingstone; and he cast in his lot with the people, fixing himself at Belmonte in Bihé, where he built his home, and maintained, at his own expense, a schoolhouse.

His open and manly character and his fair dealing conciliated the regard of the natives, and added to the prestige of the Portuguese name. In 1889, by an unhappy accident, his house was burned to the ground, and he was reduced to poverty. The Lisbon Geographical Society undertook measures for his relief, and appealed to the government in his behalf; but his unexpected death put an end to these efforts.

CHARLES A. JOY,

BORN, OCTOBER 8, 1823

DIED, MAY 29, 1891.

Prof. Charles A. Joy, a chemist and scientist of reputation, was born at Ludlowville, Tompkins County, New York. He studied at Union College, and at the Harvard Law School, and afterwards at Göttingen and in Paris.

He occupied the Chair of Chemistry, first at Union

College, and afterwards, for twenty years, at Columbia, withdrawing in 1877, on account of failing health.

He was an officer of the American Geographical Society for about three years, having been elected a member of the Council at the annual meeting held January 19, 1875, and twice elected Foreign Corresponding Secretary; the first time at a special meeting of the Council, held February 12, 1876, to fill the vacancy caused by the death of Dr. E. R. Straznicky, and again at the annual election held January 16, 1877.

TITLES OF PAPERS IN GEOGRAPHICAL JOURNALS.

AMSTERDAM.—*Tijdschrift van het Kon. Nederlandsch Aardrijkskundig Genootschap.*

Public Works in 1889—Differences of Level from a Normal Zero Point—The Assistant-Residence at Gorontalo (Celebes)—Time Reckoning in the Philippines—Late Publications on General Geography—Our Library—Geographical Works and Maps brought out in the Netherlands in 1890—Communication concerning the Scientific Exploration of the Kei islands (Malay Archipelago)—The Geographical Congress at Berne—An Observation repeatedly made in a little Excursion through North Overyssel—The Geology of Celebes—Report of a Voyage in the East India Archipelago in 1888–1889, under instruction of the Netherlands Geographical Society.

BERLIN.—*Gesellschaft für Erdkunde, Verhandlungen.*

Periodical Changes of Position in the Earth's Axis (Prof. W. Foerster)—A Second Visit to the

Veddas of Ceylon (Dr. P. Sarasin)—Grombtchefsky's Expedition to Central Asia in 1889–1890 (Conradt)—On the Mechanical Effects caused by Water Ice (as distinguished from Snow Ice), by Dr. E. Goebeler.

Zeitschrift.

The Punjab (Dr. E. Jung)—The Kinkoni Region in Western Madagascar (Dr. A. Voeltzkow).

EDINBURGH.—*The Scottish Geographical Magazine.*

From the Mouth of the Tana to the Source-region of the Nile (Dr. Carl Peters)—The Mapping of the World, Part III.: Asia (J. G. Bartholomew, F.R.S.E.)—The Pilcomayo Expedition—Southern Africa, Past and Present (Rev. James Stewart, M.D.)—On the Comparative Value of African Lands (A. Silva White, F.R.S.E.)—Explorations in British East Africa—Britannic Confederation, 1 : A Survey of Existing Conditions (Sir John Colomb, K.C.M.G., M.P.—Methods and Processes of the Ordnance Survey (Col. Sir Charles Wilson, K.C.B., etc., Director-General of the Ordnance Survey of the United Kingdom)—Statical Oceanography, A Review (Hugh Robert Mill, D. Sc.,etc.)

GOTHA.—*Petermanns Mitteilungen.*

Maj. v. Wissmann's Second Journey across Africa, 1886 and 1887 (Dr. B. Hassenstein)—The Kapaonik Range in Servia (Dr. W. Götz)—Danish Explorations in Greenland in 1889 and 1890 (H. Rink)—The Distribution and Extension of the Races in Brazil according to our present Information (Dr. P. Ehrenreich)—Development of the Watersheds in the Region of the Julian Alps (Dr. O. Gumprecht)—The Former Lalathal Glacier in the Rodna Mountain (Dr. F. W. Paul Lehmann).

LISBON.—*Boletim da Sociedade de Geographia.*

Maritime Achievements of the Portuguese in the XVI and XVII Centuries (Sousa Viterbo)—The Golden Fields: Portuguese Africa (A. P. Paiva e Pona)—Expedition to the Muatayamvo: Diary of J. Rodrigues Graça, 1843-1847.

LONDON.—*Proceedings of the Royal Geographical Society.*

The Meteorological Results of the *Challenger* Exposition in Relation to Physical Geography (Alexander Buchan)—Notes on a Botanical Trip in Madagascar (G. F. Scott Elliott)—Some Further Notes on North Morocco (Walter B. Harris)—Summary of Recent Pendulum Observations in Russia (E. Delmar Morgan)—Messrs. Jackson and Gedge's Journey to Uganda viâ Masai-Land (E. G. Ravenstein)—Expedition of the Brothers Grijimailo to the Tian Shan Oases and Lob-Nor. Translated, with Notes and Introductory Remarks, by E. Delmar Morgan—From Hai-Phong in Tong-King to Canton, Overland (A. R. Agassiz)—Journey along the Southern Frontier of Nyassa-Land (John Buchanan)—The Sundarban: Its Physical Features and Ruins (John Rudd Rainey)—Note on the Kur River in Fârs, etc. (A. Houtum-Schindler)—Manipur.

MADRID—*Boletín de la Sociedad Geográfica.*

Spanish Guinea—Spain in Africa—Internal Navigation in Spain (D. Andrés de Llauradó)—The Island of Fernando Po (D. German Garibaldi)—Summary Account of the Travels and Explorations performed by Spaniards during the present century, presented to the IV International Geographical Congress, held in Paris, August, 1890, by D. Francisco Coello—The Roman Roads and the Routes of Pilgrimage in Spain: An Extemporaneous Sketch laid before the IV International Geographical Congress in Paris by D. Francisco Coello, President of the Madrid Geographical Society—Authentic Notices of the Famous River Marañon (D. Marcos Jiménez de la Espada).

PARIS—*Société de Géographie, Compte Rendu.*

The Configuration of the Aral Sea and the Formation of the Fresh-Water Lake of Aibugir, lately surveyed—M. Raoul Humann in the region of the Donaï (Cochin-China)—The Pacific Slope of Costa Rica — French Geodesy — Annamite Tea and Its Culture—Rousson and Willems in Tierra del Fuego—The Kola Peninsula (Lapland)—Ryder's Greenland Expedition — The Geographical Congress at Berne—The Causse de Gramat and the Hidden River in the Abyss of Padirac — Reception of Messrs. Catat, Maistre and Foucart, Explorers of Madagascar—M. Gallois and his volume on *The German Geographers of the Renaissance*—The Veddas—Capt. Monteil in the Niger Basin—M. E. Blanc in Central Asia—M. and Mme.

Rogozinski in Western Africa—M. J. Martin in Asia—South Africa and M. Foa's proposed Expedition—Meeting of the *Société*, April 17—The Winter of 1890–91 in Central Asia and Siberia—The Transcaspian Railway—M. Roux in Kashmir—M. de la Martinière in Morocco—Uganda — Madagascar — The independent Bataks in Sumatra—M. Boutroue's Archæological Mission to Portugal—A Map of America, of 1669—The French Sudan.

ROME.—*Società Geografica Italiana, Bollettino.*

The Traveller Enegildo Frediani (Dr. A. Wolynski)—Colonies and States of South Africa (G. D. Cocorda)—Lake Toba and the Batak Country (Elio Modigliani)—The Badoeï, in Java (Prof. E. Teza)—Dr. A. H. Post on the Development of the Family (Dr. G. A. Colini)—From Obbia to Allula : East and North-east Coast of Somaliland (L. Bricchetti-Robecchi)—The Cartographical Projections of Albiruni (M. Fiorini).

VIENNA.—*Mittheilungen der Kais. Königl. Geographischen Gesellschaft.*

The Ninth Congress of German Geographers—Journey through Montenegro (Dr. O. Baumann)—Rainfall of Croatia (A. Franovic)—A Waterway in South America (Lieut. W. Kreuth)—Old Manuscript Charts in the Imp.-Royal Familien-Fideicommiss-Bibliothek in Vienna (Dr. A. Karpf)—Volcanoes in North-eastern Iceland (Th. Thoroddsen)—Annual Meeting of the Society.

THE PARTY AND THE OUTFIT FOR THE GREENLAND JOURNEY.

Mr. Peary's expedition left New York on the 6th of June; and the following letter, which appeared in the *Sun* of June 7, is reprinted as a record of interest to the Society, no less than to the friends whose good wishes go with the intrepid explorer and his companions:

"It was the writer's desire that his simple and unpretentious project for the determination of the northern terminus of Greenland should be allowed to materialize, and the party to start quietly and without notice beyond the circle of those immediately interested. After the return of the party, if successful, would have seemed an appropriate time for general notice. The publicity given the matter, though it has largely increased my work in attending to a host of correspondents, comprising friends, scientific men, applicants for positions on the expedition, enthusiasts, cranks, and others, has had advantages, in that it has brought to my attention special items of supplies and equipment of recent production which otherwise I should not have known of and which may be of much value. It has also made me acquainted with men whom it is a pleasure and an honor to know.

The wide-spread and entirely unexpected popular interest in my project has made it seem appropriate that I should comply with the request to take the public into my confidence, and tell details of interest, of my project and preparations. My project and theory is very simple, and can be stated briefly.

My party of six will be landed in June or early in July at Whale Sound latitude 77°. 30′ north.

The house will be erected at once, and the remainder of this season will be devoted to hunting for the winter's supply of meat, examining the features of the Whale Sound region, collecting natural objects, and more especially, to reconnoissances of the Inland ice in various directions.

It is anticipated that one of these reconnoissances will be carried across the great tongue of the Inland ice covering Prudhoe land to the southern angle of Humboldt Glacier and an advance depot for the main sledge journey established there.

The winter will be occupied in making and fitting sledges, clothing, and all travelling equipment, and in snowshoe and skier practice, for which the level surface of Inglefield Gulf (head of Whale Sound) is especially adapted.

Early next spring four or five of the party will start over the Inland ice to Humboldt Glacier, with full sledges and dogs, if practicable. Should favorable advance be made, this party will continue on from Humboldt Glacier to the head of Petermann Fjord. Here a second depot of supplies will be deposited, and from this point the advance party of two or three will push on with full sledges, the others returning to Whale Sound, to devote their time during the absence of the main party to meteorological observations, collecting and surveying.

The main party will proceed from the head of Petermann Fjord to the head of Sherard Osborn Fjord, establish a depot there, thence to the head of De Long Fjord, establish a depot there, thence to the northern terminus.

This point reached and determined, the main party will retrace its steps to Whale Sound, taking up the various depots, and the entire party will then seize the first opportunity to come out.

The salient features of the project are the smallness of the party and the utilization of the great interior ice plateau, the imperial highway of inner Greenland, as a road, instead of the sea of ice, and the whole theory of the project rests upon the now well-established fact that the interior of south and middle Greenland is covered with an uninterrupted ice cap, and the more than probability (in my opinion) that in north Greenland the conditions are the same and the ice cap nearly, if not quite, coextensive with the land.

I recognize the fact that there are many ways in which the reality may vary from the above, and feel that when the elaborate and scientific theories of such eminent men as Dr. Petermann and Baron Nordenskjöld, as to conditions in the Arctic beyond the horizon of actual exploration, have been shown by subsequent exploration to be entirely erroneous, it is more than nonsense for a novice to predict what he will or will not find.

My personal impression is that the northern terminus of Greenland is not north of the 85° parallel of latitude, and that the inner ice cap is practically coextensive with the land; and this opinion is shared by Judge Daly and, I think, by most other eminent geographers.

But whether this is the case, or whether Greenland extends as an Arctic continent across the pole, or is connected more or less loosely by detached masses of land with Franz Josef Land, or whether the ice cap ends at about the 82d parallel, as in Grinnell Land, I feel confident that in any contingency the efforts of my party will result in discoveries of interest, and, I hope, of considerable value to the scientific world.

Should the Greenland ice cap terminate at or south of the 82d parallel, as Gen. Greely believes, I shall endeavor to follow its edge to the unknown east coast above Cape Bismarck.

The especial advantages of my overland route over all others I regard to be as follows:

The possibility of laying a straight course from point to point, with the certainty that no tidal crack or chaos of heaped up ice will compel a long detour, or stop all further advance; that every foot travelled is a foot advanced, and the comforting assurance that nothing can happen to cut off the retreat.

The even and unvarying character of the surface to be traversed, and the gain in lightness of sledges and equipment, and rapidity of advance resulting therefrom.

The length of season (at least six months) during which sledging may be prosecuted.

The facilities that the "nunataks," or island mountain tops, which project above the "Inland ice" at distances varying from two or three to forty miles from the edge of the ice, offer for forming depots of provisions.

Depots placed on these "nunataks" are safe from the attacks of bears or other animals, and the "nunatak" itself forms a prominent landmark by which to recover the depot.

The exceptional value of the elevation of the route in accurately charting the coast and detecting the existence of more northerly land or lands. From the heights of the ice cap, with miles of the coast lying like a map below, it can be charted with an accuracy and rapidity unknown to one toiling from headland to headland along the sea-shore.

My base is the one advocated by Kane, Hayes, Hall, Judge Daly, and almost every American Arctic authority; a region having a small and kindly native population, abounding in game, and within easy reach of the whalers which pass Cape York every year, on their way to the fishing grounds in Lancaster sound and adjacent waters.

My proposed line of advance is absolutely direct throughout each stage. If it were not desirable to touch at the heads of Petermann, Sherard Osborn, and the other principal fjords which interrupt the northern coast, and determine their length and the characteristics of their heads, the line of march might follow very closely a great circle course from the head of Whale Sound to beyond Lockwood's "farthest."

As to the dangers and hardships of an eighteen months' sojourn above the 77th parallel, sentiment and imagination aside, I believe them to be no greater than they would be in northern Norway, Siberia, the higher Alps, or, to come nearer home, in Montana or Dakota in winter.

It may be news to many to know that there are now in Greenland, under climatic conditions and environment, similar to those of my proposed headquarters, Danish officers with their wives and families, living the same home life as the better classes here, with their window gardens, their music, their books, and all the other accessories of culture.

Judge Daly, the distinguished President of the American Geographical Society, who has been actively interested in and intimately associated with every American Arctic expedition from Kane's to the present one, says:

" Peary's plan of exploration, which he has made known to me in writing, is a very judicious one, and, if carried out as he proposes, will in all probability be successful.

" An exploration of the Arctic for the purpose merely of reaching the North Pole is undertaking the accomplishment of simply a geographical feat; but an exploration of the Arctic in its entirety is something of practical importance, for until we know more than we do now of what takes place in the movement of the air and of the water in the Arctic we shall not acquire what we ought to know of the laws of aerial and oceanic currents, a knowledge of great importance for navigation as well as for other purposes.

" An essential part of this knowledge is the form and direction of northern Greenland. The late distinguished German geographer, Petermann, was of the opinion that Greenland was a continent that stretched across the whole of the Arctic, but I have never been satisfied with his reason. My own impression has been that the Arctic is an archipelago of islands and that Greenland is one, terminating not much further north than the furthest point reached by our own explorers; and Peary's projected exploration, from the direction he intends to take and the manner in which he proposes to conduct it, will, I think, settle that question, an important one in respect to the mass of waters in the Arctic and their movement and direction in connection with the motion of the earth."

I shall endeavor to collect all scientific material and make all observations practicable, but my first and last object will be the attainment and determination of the northern terminus of Greenland, and everything will be subservient to that.

THE MEMBERS OF THE PARTY.

I shall be accompanied by five young men, and the following particulars about the members of the party may be of interest:

John M. Verhoeff, of Louisville, Ky., is a young man of 25, educated in an Eastern university, a mineralogist, and, though somewhat below the average in stature, has a magnificent lung development and a record for endurance and cross-country walking. Mr. Verhoeff has contributed generously to the expenses of the expedition.

Dr. Frederick A. Cook, the surgeon of the expedition, is an able young physician and surgeon, a native of New York State, a graduate of the College of Physicians and Surgeons and of the University of the city of New York, and has been in practice in New York City for several years. He is 26 years old, strongly built, height 5 feet 9 inches, weight 150 pounds, lung expansion 5 inches.

Langdon Gibson, of Flushing, L. I., is a stalwart young fellow of 26, and one of the many active and enthusiastic members of the American Ornithologists' Union. He was one of the Brown-Stanton party in the memorable Colorado Cañon survey of 1889–1890, and knows what arduous work is. He is six feet tall, weighs 178 pounds, and has an exceptionally fine lung development.

Eivind Astrüp, of Christiania, Norway, is a stalwart young fellow, who has but recently come to this country. He is the son of the commander of the Royal Civil Guard of Christiania, a first-class graduate of the Christiania Commercial College, and a winner of numerous prizes in athletic sports, especially ski-running. He is 5 feet 7 inches in height, weighs 167 pounds, and has a lung expansion of 4 inches.

Matthew Henson is a hardy young colored man, a native of Virginia, 23 years old. His intelligence and faithfulness, combined with more than average pluck and endurance, as shown during several years that he has been with me through varying experiences, part of the time in Nicaraguan jungles, lead me to regard him as a valuable member of the party.

The members of my party are all young, and, in addition to possessing first-class physique and perfect health, they are men of education and attainments. I believe this to be the type of man best fitted to endure with minimum effect the ordeal of the Arctic winter, and to effectively execute a two or three months' dash on sledges, where intelligent will-power, elasticity, and enthusiasm are at a premium over the stolid endurance of muscles hardened by years of work.

Mrs. Peary will accompany the party to Whale Sound. Possessed of youth, health, energy, and enthusiastic interest in the work, she sees no reason why she cannot endure conditions and environment similar to those in which Danish wives in Greenland pass years of their life. In this opinion I fully concur, and believe that in many ways her presence and assistance will contribute to the valuable results of the expedition, as they have been invaluable to me in the preparation.

FOOD SUPPLIES OF THE EXPEDITION.

The food supply of the party is not materially different from that of the later Arctic expeditions. Tea, coffee, sugar, and milk are in quantity sufficient to last two and a half years; other supplies for a year and a half. But little meat will be taken, outside of the pemmican for the sledge journey, as there is an abundance of reindeer, ptarmigan, Arctic hares, foxes, ducks, loons, seals, and walrus in and about Whale Sound.

Special items of interest, principally for the sledge journey, are as follows: Tea, compressed into one-fourth pound cakes, partially divided like chocolate, into one-fourth ounce squares. Each square, when broken off and crumbled up, will make a generous cup of tea. This tea was obtained from London, through the kindness of Mr. B. F. Stevens, so well known to navy men.

Compressed pea soup tablets, a German preparation. Each tablet contains pea meal, bouillon extract, and seasoning and, when crumbled and stirred into boiling water, will make a quart of nutritious and palatable soup.

Beef meal pemmican and beef meal and cocoa tablets, prepared expressly for the expedition. Both of these preparations are experimental, but there seems every reason to believe that they may prove a valuable addition to the menu of Arctic sledge parties. The beef cocoa tablets, it is anticipated, will be valuable as a lunch while marching, when it is not desirable to halt for a regular meal.

Evaporated cabbage, potatoes, onions, turnips, and carrots have been prepared expressly for the expedition. Evaporated apples and potatoes will form part of the daily bill of fare. The items marked * in the following provision list are all packed in rectangular sealed tins, containing twenty-five pounds net each, and two tins are packed in a close box. The gross weight of each box does not exceed seventy pounds, and every box and package is stencilled with its contents. Here is the provision list:

Tea,* coffee,* sugar,* condensed milk, hard bread,* corn meal,* rice,* hominy,* lard, pemmican, breakfast bacon, canned corned beef, salmon, baked beans, canned corn, canned peas, evaporated apples,* potatoes,* cabbage,* onions,* turnips,* and carrots,* canned tomatoes, assorted fruits, maple sugar, cranberry jam, compressed pea soup,* salt, chocolate, cocoa, corn starch, pickles, raisins, vinegar, pepper, ginger, mustard, cloves, cinnamon, nutmeg, lemon extract, vanilla extract, Worcestershire sauce, ketchup, hops, lime juice, yeast powder, Liebig extract, plum pudding, extract of coffee, beef meal pemmican, beef meal and cocoa tablets.

The sledge ration, unless experience suggests a modification, will consist of pemmican, cranberry jam, hard bread, pea soup, tea, and condensed milk.

THE HOUSE TO BE BUILT AT WHALE SOUND.

Next to the food supply comes the house. This will be a light 12x20 structure (inside measurement) with double walls enclosing a ten-inch air space. There will be a triangular air space between the ceiling of the rooms and the roof sheathing, and the rooms will have three layers of tarred paper between them and the exterior air. The walls of the rooms will be hung at first with blankets, and later probably with skins.

The house will be surrounded by a wall of stones, turf, and snow as high as the eaves, leaving a narrow passage entirely around the house, and during the winter this space and the roof of the house itself will be covered in with a thick layer of snow.

THE EQUIPMENT.

The expedition will have two whale boats, built expressly for it, and supposed to be the best that can be made.

One of these, built by S. H. Mitchell of New Bedford, is 28 feet long, 6 feet beam, and 28 inches deep amidships. This boat weighs 800 pounds, and carries one sprit sail and a large jib. The other built by Reeves & Comstock, of New London, Conn., is 28 feet long, 6 feet beam, and 24 inches deep, and weighs 600 pounds. It has two masts, sliding gunter rig, and a jib. Both boats have white cedar planking and white oak frames and knees, and are fitted with steel keel shoes, and sleeping cuddies, and each has a rudder and tiller, a steering oar, five pulling oars, and a grapnel.

One of these boats has been named the *Mary Peary*, after the mother to whom I owe so much, whose prayers, if earnest human appeals have power to influence the Infinite, will bring the expedition back successful.

The other has been named the *Faith*, after the sturdy boat which thirty-six years ago brought Dr. Kane and his brave companions back to friends and civilization, past the same cliffs and bays that will know this new *Faith*. There will be several sledges, including the two made and used by me in Greenland in 1886. The new ones, though of the same type, will be lighter than the old ones.

Each member of the party will have Indian snow-shoes and Norwegian "ski," moccasins and rubber ice creepers. The alcohol stoves will be very light, with asbestos jacketed boilers. The sleeping bags will be of elk skin. All special clothing taken from here will be woollen fur clothing to be obtained at Whale Sound.

Special items are heavy grades of hygienic underwear, blanket combination suits, blanket and knit mittens and socks, blanket coats with hoods, knit hoods, and heavy knit stockings.

Each member of the party will have a Winchester 44-calibre repeating carbine and a hunting knife. There will be also a Winchester 45-calibre repeating rifle, a Winchester repeating shot-gun, 10 gauge; a Daly three-barrel gun, shot barrels 10 gauge, rifle barrel, 45-calibre, and Colt's frontier revolvers.

The Winchester and Daly shot-guns take the same shell, the 45-calibre Winchester and the Daly rifle-barrel take the same cartridge, and the Winchester carbines and Colt's revolvers use the same cartridges.

The other articles of my equipment are as follows:

THE SURVEYING OUTFIT.

This comprises one traveller's theodolite, arranged expressly for the work, by Pauth & Co., with prismatic eye-piece, colored glasses, striding level, and 6½ inch vertical circle, reaching to 10 seconds.

One sextant, 7 inch, with artificial horizon and extra mercury.

One pocket sextant.

Three pocket half chronometers, made for the expedition by the Howard Watch Company.

One prismatic compass.

One sledge compass.

Seven pocket compasses.

Three aneroids, reaching to 12,000 feet.

One aneroid, reaching to 8,000 feet.

One aneroid, reaching to 3,000 feet.

One Henderson's self-registering pocket thermo-barometer, by Queen & Co., with set of extra thermometers by Green.

One one-hundred foot steel tape.

Two fifty-foot steel tapes.

Three odometers.

One field-glass.

Two spy-glasses.

One deep-sea thermometer.

METEOROLOGICAL OUTFIT.

One observatory barometer, Green, No. 2.

One hygrometer.

Four sets maximum and minimum thermometers.

Six special minimum thermometers graduated to—68° F.

Two special minimum thermometers graduated to—80° F.

Six mercurial thermometers.

One anemometer.

The photographic outfit consists of three kodaks, No. 4, 4x5, made for the expedition, and 2,000 films.

MISCELLANEOUS ARTICLES.

Oil stoves.

Japanese kiros.

Navy blue lights and signals.

Rockets.

Burning glasses, flint and steel, pocket lamps, and many other articles too insignificant to mention, yet of importance in a region where not even a piece of string or a paper of pins can be obtained.

THE VOYAGE TO WHALE SOUND.

The party will go from New York to Whale Sound in the steamer *Kite*, owned by Bowring Bros., of St. Johns, N. F. She will leave New York with the expedition on or about June 6. The *Kite* is a barkentine-rigged vessel, built for a whaler but used principally as a sealer. She can steam 7½ knots, and has been thoroughly overhauled and additional cabin accommodations put into her for the party.

She is a stanch, strong vessel, and is considered especially adapted for the voyage. After the North Greenland party is landed at Whale Sound she will be taken charge of by Professor Heilprin of the Philadelphia Academy scientific expedition for a two-months' scientific cruise in Arctic waters.

Although it is impossible to mention all to whom I am under obligations for courtesies and encouragement, I cannot omit to mention some to whom I am especially indebted.

To Profs. Lee and Young and the President and other members of the faculty of Bowdoin College, my alma mater, to Prof. F. W. Putnam of the American Association for the Advancement of Science, to Judge Daly, to President Adams and the Executive Committee of the Geographical Department of the Brooklyn Institute, to the late distinguished President Leidy and the Council of the Academy of National Sciences of Philadelphia, I am indebted for cordial and most valuable endorsement of my project.

To Secretary Tracy I am indebted for my leave, for his approval of my project, and for his kindly interest in my plans; and to Commodore Farquhar and Chief Engineer Melville, chiefs respectively of the Bureaus of Yards and Docks and Steam Engineering, for kindly offices which no others were in a position to render so effectively.

To the National Geographic Society I am under obligations for its interest in my work, and to the society and Miss Ulrica Dahlgren for a beautiful flag to be carried to the "farthest."

Though friends in the Portland Society of Natural History and others have accompanied their wishes for success with tangible enclosures, it is to the American Geographical Society, and particularly to the efforts of the active, enthusiastic members of the North Greenland Committee of the Philadelphia Academy of Natural Sciences, Profs. Leidy, Sharp, Heilprin, and Brinton, Mr. Hart, and Drs. Ruschenberger and McCook, that I am indebted for the sinews of war necessary, in addition to my own resources, to fit out my expedition.

And when the unlooked-for point blank refusal of the Dundee whaling companies and the director of the Greenland trade to give my party transportation to Greenland in any of their vessels, on any terms, made it necessary to charter a vessel for the purpose, Prof. Putnam in behalf of his Department of Ethnography of the World's Fair, Mr. Verhoeff, and the organization by the Philadelphia Academy of a party of scientific men to make an extended scientific cruise, assured the additional funds necessary to meet the more than double expense.

To the press of the country I am indebted for its exceptionally friendly attitude toward my project. This fact has been as pleasant to me as it has been entirely unexpected.

R. E. PEARY, U. S. N.

WASHINGTON LETTER.

June 15, 1891.

Results of the Census.—In the division of Mines and Mining of the Census Bureau some important features are developed in connection with several mining industries. The production of mica, for instance, is not at present a profitable industry in the United States. The capital invested ($691,550) yielded in 1889 less than $52,450 (at a cost of $58,335); a decrease of $313,525 since 1884. In the former year the price of cut mica was $2.50 per lb.; in the latter year about $1.00 per lb. The yield fell off chiefly because the demand changed from large to small sheets. The production of the latter description not being found profitable, many miners ceased operations, and consumers were compelled to look to foreign sources for supplies. The foreign supply, after gaining a foothold in American markets, more than held its own, and as its tendency has always been towards a reduction in prices, there has been little inducement for the outlay of domestic capital. Unmanufactured mica was imported into the United States in 1889 to the value of $97,351, nearly double the value of our own product. New Hampshire and North Carolina are the only localities in which the industry assumes any importance. Aside from the well-known use of sheet mica in stove panelling, it has of late years become important in the manufacture of electrical apparatus. Ground mica is used in the manufacture of a lubricant for journals and heavy bearings generally. It is also used in fancy grades of wall paper. In fact there is a greater range for the use of ground mica than for the mineral in sheets, with a probability that its use will be widely extended whenever mechanical genius has overcome some of the difficulties in grinding.

The production of native manganese ores increased from 4,895 tons in 1881 to 34,524 tons in 1887, since which it has declined to 23,927 tons (1889). More of the product is taken from the State of Virginia than from all the rest of the United States, and it is probably fair to say that the deposits of that State have produced more than any other mine in the world.

Petroleum was produced in eleven States in 1889, but of these Pennsylvania and New York yielded nearly nine tenths of the whole amount. Nearly the entire amount produced in California, Indiana and Ohio was used for fuel, while nearly the entire amount produced in Colorado, New York, Pennsylvania and West Virginia was used for illuminating purposes.

In studying the results of the last census one does not meet with so many surprises, if obvious causes are taken into the account. It is not difficult to understand, for instance, why the distinctive rural counties of New Jersey, such as Sussex and Hunterdon, show decreases in population, while Atlantic, Hudson, Passaic, Middlesex and Mercer, counties with urban populations, show increases varying from 92 to 138 per cent. The same is true of Connecticut, where by far the largest increase has been in the urban counties, such as Fair-field, New Haven and Hartford, although the percentage of increase in this State is much smaller than in New Jersey. In the State of Maine the decrease of rural population was so great that although, in the ten counties containing cities, the increases ranged from 7 to 50 per cent., the total population of the State increased but 1.87 per cent. Seven out of the sixteen counties show positive decreases.

Here are some of the results in these three States :

	1890.	1880.	PER CENT.
Newark, New Jersey....	181,830	136,508	33.20
Jersey City, "	163,003	120,722	35.02
Paterson, "	78,347	51,031	53.53
Camden, "	58,313	41,659	39.98
Trenton, "	57,458	29,910	92.10
Hoboken, "	43,648	30,999	40.80
Elizabeth, "	37,764	28,229	33.78
Bayonne, "	19,033	9,372	103.08
Orange, "	18,844	13,207	42.68
Atlantic City, "	13,055	5,477	138.36
Passaic, "	13,028	6,532	99.45
Perth Amboy, "	9,512	4,808	97.84
Morristown, "	8,156	5,418	50.54
Bridgeport, Connecticut....	48,866	27,643	76.78
New Haven, "	81,298	62,882	29.29
Hartford, "	53,230	42,015	26.69
Waterbury, "	28,646	17,806	60.88
Meriden, "	21,652	15,540	39.33
Norwalk, "	17,747	13,956	27.16
Norwich, "	16,156	15,112	6.91
New London, "	13,577	10,537	30.56
Portland, Me.	36,425	33,810	7.73
Lewiston, "	21,701	19,083	13.72
Bangor, "	19,103	16,856	13.33
Biddeford, "	14,443	12,651	14.16
Augusta, "	10,527	8,665	21.49
Waterville, "	7,107	4,672	52.12
Belfast, "	5,294	5,308	....

GEOGRAPHY AND THE CENSUS.—Mr. Henry Gannett, the geographer of the Census, has evolved a good piece of physical geography which might well be familiarized. He makes subdivisions of the country into areas differing in the character of their surface, their products and their climate. The subdivisions, beginning at the Atlantic coast are, in the order named :

Coast Swamps,
Atlantic Plain,
Piedmont Region,
New England Hills,
Appalachian Mountain Region,
Cumberland-Allegheny Plateau,
Interior Timbered Region,
Lake Region,
Ozark Mountain Region,
Alluvial Region of the Mississippi.
Prairie Region,
Great Plains,
North Rocky Mountain,
South Rocky Mountain,
Plateau Regions,
Basin Regions,
Columbian Mesas,
Sierra Nevada,
Pacific Valley,
Cascade Range,
Coast Ranges.

The characteristics of the divisions are briefly these :

The COAST SWAMPS are found along the South Atlantic and Gulf coasts, extending inland to varying distances, in some places as much as a hundred miles. Their greatest breadth is in North Carolina and Louisiana, but they border nearly the whole coast from southeast Virginia to the Rio Grande in Texas. The population is mainly of the colored race.

The ATLANTIC PLAIN is a strip lying between the coast swamps and the fall line throughout the Atlantic States south of New York, and the Gulf States as far as the Mississippi. The surface is level, and the elevation scarcely reaches 200 ft. above the sea. Largely covered with fine forests. Underlaid by recent sedimentary rocks.

The PIEDMONT REGION extends from Maine to Alabama, between the fall line on the east, and the Blue

Ridge on the west. Forested with a mixed growth, and underlaid by metamorphic rocks.

The NEW ENGLAND HILLS include the hill country in the upper part of New England, and the Adirondacks of New York. Elevation from one to six thousand feet. Covered with forests.

The APPALACHIAN MOUNTAIN REGION extends from New Jersey to Alabama, and includes the Blue Ridge and the Appalachian valley north and west of it.

The CUMBERLAND-ALLEGHENY PLATEAU is the escarpment-region which rises from the northwest border of the Appalachian valley, extending more or less continuously from northeastern Pennsylvania down to Maryland, Virginia, and Tennessee into Alabama. This plateau is deeply scored by streams with a general northwesterly direction. The streams have cut the plateau into a mass of very irregular ridges and gorges, making it one of the most intricate mountain regions on the globe. The whole region is densely covered with forests.

Southern Ohio and Indiana, the western half of Kentucky and Tennessee, and the northeastern part of Mississippi, with small areas in adjoining States, comprise the INTERIOR TIMBERED REGION.

A narrow strip of country bordering on the great lakes has been segregated under the name of LAKE REGION. It includes small parts of New York, Pennsylvania and Ohio, and most of Michigan, Wisconsin and northern Minnesota. This region has many of the characteristics of a coast climate.

The OZARK MOUNTAIN REGION is located in north-west Arkansas, southwest Missouri, and the eastern part of Indian Territory.

From Cairo, at the mouth of the Ohio to the coast swamps in Louisiana, including parts of Missouri, Arkansas, Mississippi and Louisiana with small areas in Kentucky and Tennessee, extends the ALLUVIAL REGION OF THE MISSISSIPPI. Most of it is marshy, and below the level of the river waters. The dry land is mainly along the immediate banks of the streams. Inhabited mostly by the colored race.

The PRAIRIE REGION comprises a small portion of western Indiana, most of Illinois and Iowa, southern Wisconsin and Minnesota, northern Missouri, eastern Dakota, Kansas and Nebraska, and a broad belt through Indian Territory and Texas. It is the granary of the country, and merges on the west into the GREAT PLAINS which extend from approximate Longitude 99° to the foot of the Rocky Mountains and from Canada to the Rio Grande. In this latter region the rainfall is insufficient for the needs of agriculture.

The CORDILLERAN REGION and ROCKY MOUNTAIN REGION (North and South Rocky Mountains) are located in Washington, Oregon, California, Nevada, Arizona, Idaho, Montana, Wyoming, Colorado, New Mexico. The climate in some parts is very arid, and in other parts very moist. The prevalence of forests accompanies the rainfall. In some sections the forests are very dense, and the trees of enormous size.

The region of great PLATEAUS, whose surfaces are level or slightly inclined, and terminate in great lines of cliffs in some cases thousands of feet in height, is located in the drainage basins of the Colorado, above the mouth of the Virgin River in southern Nevada. These plateaus descend from the mountains by a succession of gigantic steps from an elevation of 12,000 feet down to one or two thousand feet above the sea. Every stream is in a cañon. The higher plateaus are green, the lower are absolutely sterile.

The BASIN REGION, which has no drainage to the sea, is in the interior of the Cordilleran region already described, and comprises practically all of Nevada, western Utah, part of eastern California, and southern Oregon. It is a closed basin, and only discharges its waters by sinking them into the thirsty soil, or by evaporation. The rainfall is so scanty that there are but two or three running streams of any magnitude within it. In the eastern part the largest basin is that known as the Great Salt Lake. In the western part the principal basin is that of the Humboldt River. The elevation of the floor of the basin ranges from 6,000 feet near its middle line, downward, reaching in *Death Valley* in eastern California an elevation of 200 feet below the level of the sea.

The drainage basin of the Snake River in Idaho, Oregon and Washington, together with a part of the basin of the Columbia in the latter State, has been in great part caused by eruptions of basalt, which, bursting out of the soil at various points, has spread over the country, forming table-lands, which are named the COLUMBIAN MESAS.

Separating the Great Basin from the California valley in eastern California, is a broad, heavy forest-covered range of mountains with long slopes to the west and an abrupt ascent to the east,—the SIERRA NEVADA.

The PACIFIC VALLEY, so-called, is west of the Cascade range and the Sierra Nevada, and stretches from Puget Sound to southern California. It is drained in Oregon by the Willamette and in California by the Sacramento and San Joaquin rivers.

Stretching northward in line with the Sierra Nevada, but distinguished sharply from it by the high character of its formation is the CASCADE RANGE. It is a series of extinct volcanoes, rising from a high plateau of volcanic rock.

Separating the Pacific valley from the Pacific is a succession of ranges trending parallel with the coast and known as the COAST RANGES. In southern California the valleys among these ranges are of the highest degree of fertility, and produce grapes and tropical fruits in profusion.

Mr. Gannett has prepared a table showing the distribution of population in 1870, 1880, and 1890 in accordance with these topographic features. Grouping the subdivisions, the table shows that 4.3 per cent. of the population is found in the swamp regions, including in that term the coast marshes and the alluvial region of the Mississippi River;—mainly the colored race. In the desert and semi-desert regions 2.3 per cent. In the mountain region of the west about 2.5 per cent., while the eastern mountain region contains about one-sixth of the entire population.

Another table prepared by Mr. Gannett shows the population of the country by square degrees, that is to say, by areas included between consecutive parallels and consecutive meridians. The square degrees between latitudes 39° and 43° and longitudes 71° and 76° contain about one-tenth of the population.

In two of the Census bulletins (Nos. 35 and 60) treating of irrigation in Arizona and New Mexico, the natural features of these territories are detailed with minuteness, including descriptions of the counties, courses of rivers and streams, elevations, etc. Mr. F. H. Newell is charged with the preparation of these papers.

REVISION OF GEOGRAPHIC NAMES.—In his last annual report the Hydrographer of the Navy Department, in speaking of the desirability of a uniform system of spelling geographic names in charts and sailing directions, said: "A board has been for some months investigating the subject with a view to such modifications of the Admiralty system as will render it appropriate for adoption, or, at its discretion, to report an original method, if necessary. For some time we have been in communication with all foreign hydrographers, examining into their methods, and much valuable information has been received, and it is hoped that the results arrived at will soon be ready for publication."

The board, which was organized in February, 1890, consisted of Lieut. Charles M. McCarteney, U. S. N., Chief of Division of Sailing Directions; Mr. Boynton Leach, Assistant, the editor of *Notices to Mariners*, and Mr. Gustave Herrle, Chief draughtsman.

The report of this Board (Hydrographic Office Publication No. 98) has just been published for the consideration of the United States Board on Geographic Names.

In order to learn the uses prevailing in foreign countries, a circular letter was addressed to hydrographic offices, and to various geographic societies and individuals. Replies were received from the hydrographers of Great Britain, France, Spain, Chile, Netherlands, Netherlands-India, Italy, Japan, the Secretary of the German Marine, the Marine Department of Ottawa, the Coast Pilot Bureau of Austria-Hungary, the Archive of Sea Charts of Denmark, the Inspector-General of the Imperial Chinese Customs Service, the United States Ministers to Greece and Mexico, and several others. This correspondence, which is published with the report, will be of great use in determining the correct usage of foreign geographic names, and, where other than Roman characters are used, what are the proper equivalents for transliteration.

Efforts have been made to eradicate the existing confusion by the adoption of fixed systems of orthography on the part of the hydrographic offices of Great Britain, France and Germany. The British system was adopted in 1885 by both the Hydrographic Office and by the Royal Geographical Society. M. Bouquet de la Grye, in behalf of a commission appointed by the Société de Géographie, reported in 1886 a system largely formulated after the British, and the German Hydrographic Office adopted rules in 1888 which also closely follow the British system.

An examination of these three systems discloses the fact that they divide all geographic names into two classes, on the following propositions: 1. Geographic names originating in languages that are written in Roman character should be spelled as in the country having jurisdiction. The French and German systems allow exceptions to this rule in the case of names which, through long custom, have become generally known in another form. 2. Geographic names originating in languages without literature, and in languages that require transliteration into Roman character, should have their spelling based on the true sound of the word, as locally pronounced. In regard to the phonetic values of the letters in names of the second class, the report says that the three systems show a remarkable agreement resulting from the adoption by the British of the Italian or continental vowel sounds, and from the adoption to a very large extent of the English consonantal sounds by the French and German Hydrographic Offices. All three systems, however, permit exceptions in names of class 2, where long used orthography, though it may not be in accordance with adopted rules, has become generally familiar. The three systems also recognize the futility of providing for the more delicate inflections of sound and accents in foreign names of class 2, by discarding diacritical signs, the British and German systems confining themselves to the use of the acute accent, and the French retaining only the circumflex accent (^) and the apostrophe ('). The American system, as will be noticed further on, also discards, or at least says it is desirable to avoid, the use of diacritical characters.

As far as is known, none of the other hydrographic offices have as yet any fixed system of orthography in use, unless Spain is excepted, whose Hydrographer has outlined a system, based mainly on that of the French, which is intended to be adhered to in future Spanish Hydrographic Office publications.

The Report says: "The difficulties in the way of practical application of these systems are various and many, and not the least is the uncertainty existing in regard to the correct local pronunciation of many of the names in distant foreign lands, that use another than the Roman character in their writing. Where the local pronunciation of the name is absolutely known, it may be readily spelled under the general system, but where the written form only is available, detailed systems in harmony with the general system can be advantageously used for transliterating and thus assist in bringing about the ultimate object. The Board has prepared such systems for application to Russian, Greek, Japanese and Korean geographic names, and has formulated rules and data, as far as possible, for guidance in treating Malay and Chinese names."

In regard to the names of India the Board recommends a close adherence to the forms found in Hunter's Imperial Gazetteer of India, the best authority available. The Board submits the following

STANDARD RULES.

(a) The more prominent geographic names, the orthography of which is already fixed by universal adherence to a certain form, or which are spelled in *but one way* in American and English literature, shall not be changed, although their spelling may not be in accordance with rules (b) and (c). Examples: Athens, Bombay, Ceylon, Germany, Spain, St. Petersburg.

(b) Geographic names in countries which use the Roman or Gothic characters in writing their language shall be rendered in the form found in the latest official publications, maps and books of the country having jurisdiction. In cases, however, where the form of a place-name hitherto used is so different from the official form that the identity of the latter with the former might not be recognized, the old form shall be added in brackets; as, for instance, Livorno (Leghorn), s'Gravenhage (The Hague), Wien (Vienna).

Where there is a conflict of jurisdiction, as it were, over a geographic name as, for instance, in the name of a body of water separating two or more countries, or as in Polynesian or African names, rule (a) or (c) shall be applied. Thus, Swedish and Norwegian *Skagerak*, Danish *Skagerrak* is an example where choice lies only in the spelling, and under rule (a) preference is given to double r, Skagerrak; but in the Baltic (*Baltiskoe More*, *Baltisches Meer*, *Ostsee*, *Östersjön*, **Óstersóen*) the choice lies first in the proper name, and Baltic is retained under rule (a), while the Dutch, Spanish or other rendering of Polynesian names must be treated under rule (c) if not in accord with the general system.

(c) Geographic names from languages that require transliteration into Roman character, and geographic names originating in languages without literature, shall have their spelling based on the true sound of the word as locally pronounced, and in accordance with the general system of sound equivalents given below.

On account of the difficulties inherent in the English language, an approximation to the true sound is alone aimed at in this system, the principal characteristic of which is that all vowels are pronounced as on the continent of Europe generally, and all consonants as in English:

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* The accented *ó* represents the last letter in the Danish alphabet.

Letters.	*Sounds.*	*Example.*
a	ah, a as in father	Java, Banána, Somáli, Bari.
e	eh, e as in men	Tel el Kebír, Oléleh, Medina, Levuka, Peru.
i	English e; i as in ravine; the sound of ee in beet. Thus, not Feejee, but	Fiji, Hindi.
o	o as in mote	Tokyo.
u	long u as in flute; double o, as in boot. Thus, not Zooloo, but	Zulu, Sumatra.
	All vowels are shortened in sound by doubling the following consonant	Yarra, Tanna, Jidda.
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound	Nuulua.
ö	German ö (œ)	Töchön.
ü	The French sound of u (ü); or the German ü (ue)	Bökrüt.
ai	English i as in ice	Shanghai.
au	ow as in how. Thus, not Foochow, but	Fuchau.
ao	is slightly different from above	Nanao.
ei	is the sound of the two Italian vowels; but is frequently slurred over, when it is scarcely to be distinguished from ey in the English they	Beirút, Beilúl.
b	English b.	
c	is always soft and nearly the sound of s; the hard c is given by k	Celébes.
ch	is always soft, as in church	Chingchin.
d	English d.	
f	English f; ph should not be used for the sound of f. Thus, not Haiphong, but	Haifong, Nafa.
g	is always hard (soft g is given by j)	Galápagos.
h	is always pronounced when inserted.	
j	English j. Dj should never be put for this sound	Japan, Jinchuen.
k	English k. It should always be put for the hard c. Thus, not Corea, but	Korea.
kh	the Oriental guttural	Khan.
gh	is another guttural, as in the Turkish	Dagh, Ghazi.
l m n	as in English.	
ng	has two slightly different sounds, as in finger, singer.	
p	as in English.	
q	should never be employed; qu is given by kw	Kwangtung.
r s t v w x	as in English	Sawákin.
y	is always a consonant, as in yard (Kikuyu), and therefore should not be used for the vowel i. Thus, not Mikindány, but	Mikindáni.
z	English z	Zulu.
	Accents should not generally be used, but where there is a very decided, emphatic syllable or stress which affects the sound of the word it should be marked by an acute accent.	Tongatábu, Galápagos, Paláwan, Sarákwak.

The above system of sound equivalents is substantially the same as that adopted by the United States Board on Geographic Names which was organized in April, 1890, and formally created by an Executive order September 4, same year. Let it not be misunderstood that there are two boards on geographic names. This report of the board of the Hydrographic office has been published for the consideration of the U. S. Board on Geographic Names, to which it has been submitted. All the chart and map producing countries are now practically in accord in their rules for geographical nomenclature.

The United States Board of Geographic Names having recently formulated additional guiding principles determining the official form or rendering of geographic names, the whole are here introduced as a matter of general interest.

1. That spelling and pronunciation which is sanctioned by local usage should in general be adopted.

2. Where names have been changed or corrupted, and such changes or corruptions have become established by local usage, it is not in general advisable to attempt to restore the original form.

3. In cases where what was evidently originally the same word appears with various spellings sanctioned by local usage, when applied to different features, these various spellings should be regarded as in effect different names, and as a rule it is inadvisable to attempt to produce uniformity.

4. Where a choice is offered between two or more names for the same place or locality, all sanctioned by local usage, that which is most appropriate and euphonious should be adopted.

5. The possessive form should be avoided whenever it can be done without destroying the euphony of the name or changing its descriptive application.

6. In all names ending in *burgh* the final *h* should be dropped.

7. In all names ending in *borough* this termination should be abbreviated to *boro*.

8. The word *center* as part of the name should be spelled *center* and not *centre*.

9. The use of hyphens in connecting parts of compound names should be discontinued.

10. The letters C. H. (Court House) as part of the names of county seats should be omitted.

11. In the case of compound names consisting of more than one word it is desirable to simplify them by uniting the compound parts.

12. It is desirable to avoid the use of diacritical characters.

13. It is desirable to avoid the use of the words *city* or *town* as a part of names.

The last eight are recent conclusions, and are important.

The Board has issued its second Bulletin containing 204 revisions of American, and 39 of foreign names. Number three will contain a corrected list of light-houses and light-house stations; and number four a list of all counties in the United States.

Lieut. Richardson Clover, the Secretary of the Board, who has been acting Hydrographer of the Navy Department since September last, has been appointed Hydrographer in fact and promoted to the grade of Lieutenant Commander.

The Hydrographic Office will soon publish a Track and Distance Chart of the World. Also, the report of observations recently made for magnetic declination, dip, and intensity, by Lieutenants Norris and Laird, and Ensigns Holcomb, L. M. Garrett, Wilson and Wood. They furnish valuable results at Vera Cruz, Coatzacoalcos, Salina Cruz, Puerto Plata, Curaçoa, and La Guayra.

The last two issues of the Pilot Chart of the North Atlantic (May and June) contain graphic daily record of the magnetic declination, or variation of the compass at Washington. The curves indicate the true direction in which the magnetic needle at the Naval Observatory pointed during each instant from noon, March 29, to noon, May 31. It is proposed to continue the publication of these curves for at least three months, and any questions regarding them will receive immediate consideration and reply. They are carefully copied and reduced one-quarter from the photographic record at the U. S. Naval Observatory. The magnetic work is in charge of Ensign J. A. Hoogewerff, U. S. N.

The current year is the eighth in the publication of the Pilot Chart, the first issue having appeared in December, 1883. The various changes and improvements that have been made in the Chart since that time are strikingly shown by a comparison between a late copy and that first issued. The most conspicuous additions are the following: Steam and sailing routes; region of equatorial rains; table of barometer normals and percentage of probable calms for each 5°-square; storm diagrams, with brief rules for action to avoid a hurricane; cautionary and storm signals in use along the Atlantic and Gulf coasts of the United States; the tracks, names and dates of derelicts; list of dangerous obstructions to navigation along the coast, and of charts published and cancelled during the preceding month; regions of observed and predicted fog. Besides these additions, and other less striking ones, the greater portion of the forecast meteorologic data have been thoroughly revised and brought up to date, while the review is now prepared with very much greater accuracy and completeness, owing to the far greater number of observers who now send in regular reports and the hearty approbation and support received from masters of vessels of every nationality.

A feature of the Pilot Chart that deserves special mention is the occasional publication of a Supplement devoted to some subject of immediate importance. This plan was first tried in September, 1887, and since that time eight supplements have been issued, each of which has attracted much favorable attention, and has been widely quoted. The following is a complete list of those published thus far:

September, 1887.—West Indian Hurricanes. Diagrams and text explaining the circulation of the wind in a hurricane, with brief rules for action.

December, 1887.—Trans-Atlantic Steamship Routes for December. The plan for steamer-routes recommended in order to avoid collisions, with a brief discussion of the winter storm-belt of the North Atlantic.

March, 1888.—Waterspouts off the Atlantic Coast of the United States during January and February, 1888. Positions of waterspouts plotted on a small chart, with reports quoted in full and a discussion of the subject.

August, 1888.—Derelicts and Wreckage in the North Atlantic. A history of the great log-raft, with a complete list of reports received from vessels that sighted the logs as they spread over the ocean, together with a graphic record of the drifts of the most notable derelicts.

February, 1889.—The Derelict American schooner *W. L. White.* An account of the transatlantic voyage of this notable derelict vessel, with all reports received and a chart showing the track of the vessel and the general drift of Atlantic currents.

October, 1889.—The St. Thomas-Hatteras Hurricane of Sept. 3–12, 1889. Ten small charts, with accompanying text, illustrating the progress of this great hurricane from St. Thomas to our coast north of Hatteras, with a complete list of vessels from which reports were received in time for use in this connection.

During 1890, no supplements were issued, but a large number of reprints, in black and white, were made of the various diagrams and printed matter accompanying the Chart. These have been widely circulated and republished.

January, 1891.—Ice in the North Atlantic during the season of 1889–90. This chart shows the positions and dates of icebergs and field-ice reported during the past season (perhaps the most notable ice season on record).

DR. JOHN B. HAMILTON.—The Government loses the services of a valuable officer in the resignation of Dr. Hamilton, until lately supervising surgeon-general of the Marine Hospital service. Dr. Hamilton is a gentleman of many accomplishments, and possesses moreover executive abilities of a very high order. He leaves the impress of intelligent and conscientious work on the department over which he has presided since 1875. The high position of this service is recognized everywhere; and to no one is this due more than to its late executive officer.

The salaries of government officers are specifically provided for by law, and it is a very difficult matter (except as to political officers) to procure readjustment based on altered conditions, or increased responsibilities. So, it not infrequently happens that in some particular service of the government duplicated in kind elsewhere, the promoters offer compensation in harmony with the advanced requirements of such service. There is scarcely a department of the government (notably those employing scientific skill and experience) that does not suffer in competition with local institutions all over the country.

Dr. Hamilton has accepted the position of professor of surgery and surgical pathology in Rush Medical College, Illinois, considered one of the finest in the West in the line of surgery.

Dr. Walter Wayman, a graduate of Amherst College, and for some time chief assistant, has been appointed to succeed Dr. Hamilton.

The marine hospital service for the care of sick and injured American seamen, originated in 1798. It supervises all United States marine hospitals, twenty additional government hospitals, and a large number of relief-stations (about 135) where medical aid is given to seamen of the merchant marine. Officers of the service examine pilots who apply for license; and crews and keepers of life-saving stations. It treats officers and crews of the revenue marine service. It is charged with the management of the eight national quarantine stations, and the execution of rules under the interstate quarantine law recently enacted, and more important still, under the immigration act passed by the last Congress, its medical officers are charged with the inspection of immigrants and with the necessary certification regarding those who are not allowed to enter the country.

The service publishes an annual report, regulations, lists of medical officers, weekly abstract of sanitary reports, and occasionally a paper on some special subject.

IMMIGRATION.—The "Immigration Act," so called, passed at the last session of Congress, established in the Treasury Department the office of superintendent of immigration, and the President is authorized and directed to appoint such superintendent, with the advice and consent of the Senate. The Hon William D. Owen, of Logansport, Indiana, has been appointed to this office. Mr. Owen, who was a member of the 51st Congress, is largely responsible for the passage of this important measure. The act took effect April 1, 1891. It prohibits the landing in the United States of the following classes of aliens:

1. Idiots.

2. Insane persons.

3. Paupers, or persons likely to become a public charge.

4. Persons suffering from a loathsome or dangerous contagious disease.

5. Persons who have been convicted of a felony or other infamous crime or misdemeanor involving moral

turpitude, not including persons convicted of political offenses only.

6. Polygamists.

7. Persons coming under contract to labor.

All corporations and others bringing into the United States aliens, falling within any of the prohibited classes, are required under heavy penalties to return them at their own cost, to the ports or countries whence they came, and this requirement holds good for *one year* after any such prohibited alien may have entered the United States. The "contract to labor" provision does not apply to ministers of any religious denomination, nor to persons belonging to any recognized profession, nor to professors for colleges and seminaries. All alien immigrants upon their arrival must be reported to the proper inspection officers. Medical examinations will be made by the surgeons of the Marine Hospital Service. Decisions made by the inspection officers adverse to the right of the alien to land shall be final, unless appeal be taken to the superintendent, whose action shall be subject to review by the Secretary of the Treasury. Any alien who becomes a public charge within one year after his arrival from causes existing prior to his landing shall be deemed to have come in violation of law, and shall be returned as aforesaid.

The Secretary of the Treasury has appointed a commission to proceed to Europe for the purpose of investigating various aspects of immigration; such as, the reasons for the outpouring from southern Europe, the character of the emigrants, municipal or society aid, whether the deportation of defective classes is encouraged, etc. The commission as at present constituted consists of Dr. Walter Kempster, Judson N. Cross, Joseph Powderly, and H. J. Schulteis, the latter as a representative of the Federation of Labor.

The *Star*, a Washington newspaper conducted with conspicuous ability, advances as an important consideration to account for the large immigration to this country, the fact that the debt of many leading foreign nations is increasing as that of the United States steadily decreases. The tabulated statement prepared by the Census Bureau for the decade of 1880 to 1890 shows that the former has increased more than two thousand million dollars ; the latter has decreased half that amount. The fact that this heavy increase of foreign indebtedness is due largely to preparation for war furnishes a further inducement to seek a land of peace and comparatively small national expenditures. An examination of the per capita debt of the various countries illustrates the comparative statement. The United States debt decreased from $38.33 to $14.63. Great Britain's per capita debt is $87.79 ; that of France $116.35 ; Russia's is only $20.79." (The figures do not help the argument of the *Star*. There is practically no immigration from France.)

EXPLORATIONS IN ALASKA, ETC.—Mr. Israel C. Russell of the United States Geological Survey is the chief of a small party recently sent to Alaska under the auspices of the National Geographic Society to explore further the region about Mt. St. Elias. The Geological Survey, the Revenue Marine Service, the Fish Commission, and the Coast Survey, to the extent of affording facilities at least, are co-operating, so that, utilizing the information derived from last year's experience in the same region, valuable results are confidently expected. In order to have the shortest possible land route, the approach to the country will be from the south by way of Icy Bay instead of from the east by way of Yakutat Bay as last season. This will avoid the loss of much time and energy. The ascent of Mt. St. Elias and study of the unmapped country to the north and west of it are primary objects. Co-relatively will be an examination of the great Malaspina glacier, and a more extended exploration of Yakutat Bay.

Mr. Marcus Baker of the National Geographic Society says that owing to last year's explorations the region between Yakutat Bay and Mount St. Elias had been charted in considerable detail, showing the assemblage of ranges, the association of peaks and the system of glacial formations, all running generally on the west side of the Coast Range down to the sea, or rather to the Malespina glacier.

Mr. Frederick Schwatka, with whom is associated Mr. C. Willard Hayes of the Geological Survey, is now in Alaska surveying the country north of the Mt. St. Elias range, and between the head waters of the Yukon and White Rivers. It is the intention of these gentlemen to ascend the Taku River and then make portages across to the lakes, thence to the head waters of the Yukon and by portage to Copper River, whence they will make their way to the Pacific Ocean.

After Lieut. R. E. Peary had explained to a public audience in Washington recently his projected expedition towards the vague northern limit of Greenland, he was presented with a silk flag of the United States, with the request that when he sets foot upon the farthest north he plant there the banner of his country and then return it to the National Geographic Society. The flag had been placed in the hands of the Society by Miss Ulrica Dahlgren.

The Postmaster-General has authorized the establishment of a very complete mail service with the Territory of Alaska, which will be inaugurated July 1, the contract having been awarded to the North American Commercial Company, San Francisco, which will put on a line of steamers running as far west as Unalaska, touching at all the intermediate ports. The distance from Port Townsend to Unalaska is 2,400 miles and from Sitka to Unalaska 1,300 miles. This service will bring into contact with civilization a vast extent of country, and people who have heretofore been debarred from communication with the United States except by means of a chance sailing vessel.

Apropos of the above, a letter was mailed at Juneau on the 1st of June and reached Washington, D. C., on the 11th of the same month.

INTERCONTINENTAL RAILWAY.—The intercontinental railway commission is an outgrowth of the recent International American Conference. The Commission after a session in Washington of several weeks' duration has adjourned until next February. Its first report has been presented to the Secretary of State. It says: A line of railroad is projected and has been surveyed from the City of Mexico to Ayutla, on the frontier of Guatemala. From Ayutla the line determined upon runs parallel with the Pacific Coast through Mazatenango to Santa Lucia, thence by Cuajiniquilapa to Santa Ana, in Salvador; thence through Nuevo

San Salvador and San Miguel to Goascoran in Honduras.

From Goascoran the line will continue along the Gulf of Fonseca, through the State of Choluteca to the city of the same name; thence through Chinadega in Nicaragua to Rivas, and along the shore of Lake Nicaragua, through Alajuela in Costa Rica, and on through San José to Puerto Limon, and thence down the isthmus of Panama to the valley of the Atrato in Colombia.

In Colombia the line will cross the western cordillera of the Andes into the valley of the river Cauca and up this valley to Popayan. A trial line for a branch road will be run from the main line to the city of Bogotá.

From Popayan the line will cross the mountains to Pasto, and thence continue through Ecuador by the cities of Tulcan, Ibarra, Quito, Cuenca and Loja and into Peru.

Through Peru the line selected will pass through the provinces of Cajamarca and Amazonas and to the river Marañon, and through its valley to Cerro de Pasco; thence along the river Perene and on to Santa Ana; thence to Cuzco, Santa Rosa and Puno, and along the shore of Lake Titicaca to the Bolivian frontier.

In Bolivia the line will pass through the cities of La Paz and Oruro to Huanchaca, where the main line will terminate. From Huanchaca, Chile, the Argentine Republic, Paraguay and Uruguay can be reached by branch lines.

Venezuela will be connected with the trunk line by a branch from the most suitable point in the valley of the Cauca to Medellin, where it will connect with an existing railroad to the city of Puerto Berrio, on the Magdalena River, and continue through Bucaramanga, San Jose de Cucuta and Merida to Valencia.

It is hoped, the report says, that the work allotted to the several parties can be completed within a year, and the main question as to whether the projected railway is practicable will have been determined.

Letters have been received from the three surveying parties, showing that their destinations have been reached. It is not thought that these parties will get back to this country for over a year.

Information has been received from Buenos Ayres to the effect, that the Trans-Andine railway between Buenos Ayres and Valparaiso is now open for traffic with the exception of the distance between Mendoza and Uspallata, 56 miles. The tunnel through the mountain, 10,500 feet above the sea, is very well along, and is expected to be finished during the present year.

HERNANDO CORTES.—The monument to the conqueror of Mexico was unveiled in his native city of Medellin, Spain, on the 2d of December, 1890. The statue was erected by the municipality, aided by contributions from the Senate and chamber of deputies of Spain. The sculptor is Eugenio Barron. The monument stands in the centre of a square formerly occupied by the Cortes homestead. It stands about ten feet high and represents Cortes in the full military dress of the period, carrying in his right hand the staff of command, and in his left the flag of Castile and Leon. The pedestal is a massive stone structure in the shape of a fifteenth century fortress, and bears on its four sides representations of broken Aztec weapons, with the inscription : Mexico, Tlascala, Otumba, Tabasco. On the front of the pedestal appears the name "Hernan Cortes," and the coat of arms which Charles V. granted him on his return from Mexico.

The Department of State has in preparation several valuable reports from American consuls abroad on several specially valuable topics:

Straits and highways of the world.

Canals and navigation in foreign countries.

Tariffs of the world.

Gas and gas manufacture in foreign countries.

Port regulations, light-houses and quarantines of the world.

Coal trade and coal production in Spanish America.

Rubber trade and rubber trees.

Lead and zinc mines and trade.

H.

CAPE PALMAS.

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BÜTTIKOFER'S LIBERIA.*

BY

GEO. C. HURLBUT.

Mr. Büttikofer says, in his preface, that too much must not be expected of him; he visited Liberia, first of all, for the purpose of studying and making himself acquainted with its zoology. He has none the less made an interesting report upon a country practically unknown, even in the United States, which brought it into being.

Liberia extends along the west coast of Africa, from the Manna River, which flows into the ocean at about 11° 30′ W. Long. (from Greenwich) to the San Pedro River, which enters the sea in W. Long. 6° 40′. The coast line is about 380 miles long, and the limits of the State in the interior (the *Hinterland*, in the convenient phrase of the day), are 80 or 100 miles from the coast. The estimates of area are necessarily even more vague than the boundaries, but there is no reason for objecting to the figure of 24,000 square miles, given by the Encyclopædia Britannica, though it probably errs on the side of liberality. The calculation of Behm and Wagner gives to the Republic of Liberia a surface of something less than 19,000 square miles ; and it is to be remembered that its nominal boundaries on the north-west and the south-east are matters of dispute with its immediate neighbors.

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* Reisebilder aus Liberia. Resultate Geographischer, Naturwissenschaftlicher und Ethnographischer Untersuchungen während der Jahre 1879–1882 und 1886–1887. Von J. Büttikofer, Conservator am Zoologischen Reichsmuseum in Leiden. —Mit Karten, Lichtdruck, und Chromolithographischen Tafeln, nebst zahlreichen Textillustrationen.—2 Vols. 8vo. Leiden, 1890.

The illustrations reproduced are from Mr. Büttikofer's book.

The country is flat and but slightly elevated above the sea. The coast is marked by a great number of capes, all with a westerly direction, and enclosing on their north side little bays that afford good anchorage for vessels. The principal points are Cape Mesurado and Cape Palmas, at which latter the coast turns from a southeasterly to an easterly direction. There are very many rivers and water-courses, but no one of them is of any great importance. The Cavally, the largest of all, is navigable for boats for about 160 miles ; but all the streams are obstructed by sand-bars at their mouths and, in their upper course, by cascades and rapids.

Behind the coast and parallel with it is a swamp of from 5 to 15 miles in breadth, with occasional patches of firmer ground and grassy hummocks, and an endless number of channels and reaches, filled with dark and quiet waters. In the rainy season, and sometimes at high tide, all this region becomes a lake. It is covered with a growth of mangroves ; and some of the higher spots afford a sustenance to a few inhabitants. Beyond the swamp the soil rises gradually into hills and even into mountains. This rising ground is well peopled and there are settlements of Liberian colonists along the streams, but the thickly-wooded mountains are almost uninhabited. Beyond the forest extends the Mandingo plain, a broad, undulating pasture land, interspersed with wooded hills, and beyond this plateau, at distances of from ten to twenty days' march, rise the mountains that divide the streams of the Liberian coast from those that belong to the basin of the Niger.

There are two seasons, the dry and the rainy, the former beginning about the end of November and closing at the end of April, when the rainy season sets in, to close in November. The transition from one season to the other is marked by violent storms. The *harmattan*, the cold dry wind from the desert, blows, especially at night, during the months of December and January. Mr. Büttikofer's description of the climate applies to the whole Guinea coast: "The mean temperature is that of a summer day in Europe, and the heat is rarely excessive. The thermometer in the shade generally stands at 77° Fahr., where it remains during the night; and it is not often that it rises beyond 88°. The contrast between the temperature of the day and that of the night is greatest at the time of the *harmattan*. European constitutions do not long resist the effect of this degree of heat in an atmosphere almost always charged with humidity, and it is an axiom on the West African coast that, after a stay of three years in that country, a white man must remove to a cooler climate for at least six months. The Liberian climate is, however, more salubrious than that of Lagos or the Cameroons, and the marsh fever is rarely fatal in Liberia.

"In many of the diseases which affect the organs of respiration, the patient is benefitted by the air of Liberia; and the typhus fever is almost unknown among the natives. On the whole, it may be said that the climate of West Africa is better than its reputation. The prevalent fever in Liberia is the intermittent, generally of brief duration, but very sudden in its attack.

"A person taken with it feels only that he is weak, but otherwise like himself. If he is in company he talks as usual and answers what is said to him, and then, all at once, his words become unmeaning and disconnected, his eyes stare, and he begins to sing or to laugh like a crazy man. Most diseases in this country leave the blood in a state of partial decomposition, and it is a common saying that, if a white man has lived long on the African coast, the prick of a needle in his flesh will bring out first a drop of water and then a drop of blood. The legs and the feet are apt to be affected with swelling, in the rainy season above all; and dropsy is common. Wounds are very painful and heal with difficulty."

The forests of Liberia have all the density and exuberant richness that characterize the vegetable world of the tropics. The woods are an impenetrable tangle of gigantic trees, bound together by vines and creepers, covered with brilliant flowers, and swarming with birds and insects in endless variety. The soil is fertile, and produces indigo, cotton, coffee, the cacao and the sugar-cane, and every kind of spice. The coffee, which is of excellent quality, and the pepper are indigenous, and the latter once gave a name to the coast.

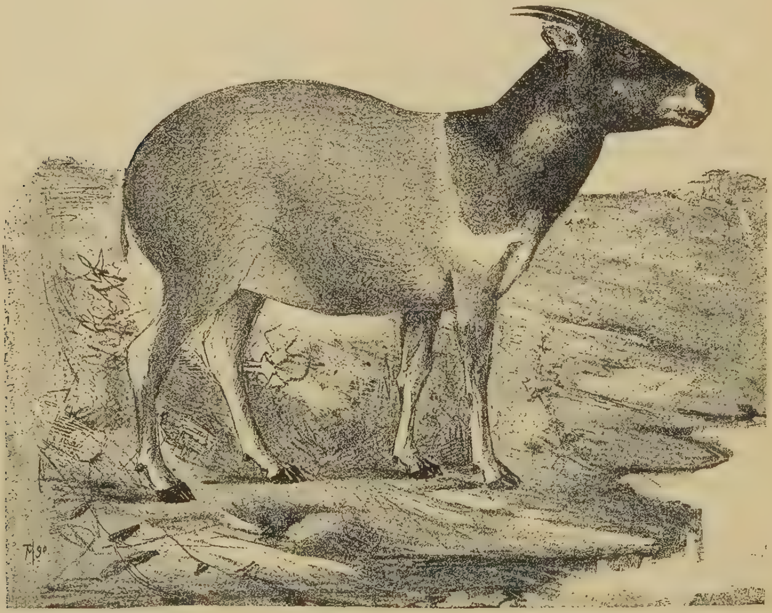
The larger part of Mr. Büttikofer's book is devoted to his special subject, the zoology of Liberia, and his discoveries in this field, already well worked by others, are of importance. He presents at the end of his second volume a catalogue of the existing animal forms of Liberia, so far as these have been described. They number: 91 mammals, 245 birds, 51 reptiles and amphibia, 82 fishes, 44 mollusks, 173 insects, 21 crustaceans, and 3 earthworms. Mr. Büttikofer's contributions to the list are 11 mammals, 7 birds, 9 fishes, 4 mollusks, 22 insects, 1 crustacean, and 3 earthworms.

The lion, a lover of the open country, avoids this wooded region and is not even found in the Mandingo plain, but the leopard is met with everywhere and ventures at times into the negro villages; and one of these unwelcome guests has been killed in Monrovia. He does not attack man, but prowls about the goat-folds by night. There are besides a tiger-cat (*F. celidogaster*), larger than the European lynx, and the serval, or bush-cat, both very destructive to the poultry.

In the neighborhood of Grand Cape Mount the ground-squirrels (*Xerus erythropus*) infest the fields of ground-nuts and cassava and gnaw the roots of the plants. They are often tamed like the true squirrels, and learn to take their food from their master's hand.

Among the larger animals the buffalo, or bush-cow, as it is called, is found in every part of the country. It is about the size of the European ox, though it does not stand so high. Very old animals lose their hair, and a specimen in the Leyden Museum has a bare, blackish hide, with here and there a few thin hairs. The horns of the Liberian buffalo are not joined at the base like those of the Cape buffalo, but leave the front of the head free; and instead of curving outwards, they turn in the plane of the frontal bone backwards, so that the points approach each other and describe the curve of a sickle. Like all of his kind, the Liberian buffalo is a very dangerous enemy, and the natives dread him more than the leopard.

The most remarkable of the nine varieties of the antelope is unquestionably the Tapir Antelope (*Terpone Longiceps*). The male of this variety has not yet been taken, but Mr. Büttikofer secured three females. These were a little below the size of the fallow deer. In its general appearance this antelope recalls the wild buffalo (*Anoa depressicornis*) of Celebes, though it has more slender legs, and in color it is remarkably like the Shabrack tapir. A peculiarity of this antelope is the



TAPIR ANTELOPE.

pouch-like gland between the belly and the upper thigh. This gland, in which a lemon might be laid, furnishes a secretion with which the animal rubs down its short hair.

Some distance below Schieffelinsville and in the triangle formed by the Junk River on one side and by its affluents, the Du Queah and the Farmington, on the others, there is a line of wooded heights, surrounded by marshes. It was here that Mr. Büttikofer shot his antelopes. It is only in the rainy season that the hunter can cross the marsh in this place, for there is no water in the dry season to float the canoes, and yet the mud is too deep to be passed on foot. The Tapir Antelope is found in other parts of the country, and one got away from Mr. Büttikofer in the woods behind Fali.

Du Chaillu was the first to discover this peculiar variety, but, though he secured the skull, which is now in the British Museum, he was unable to furnish any account of the animal itself. The long form of the skull suggested the name *longiceps*, bestowed by J. E. Gray in 1865; and from that time to the present nothing has been added to our knowledge of the subject.

This is one among many instances of the occurrence in the Gaboon and in Liberia, of new species, no one of which is to be found in the intermediate districts, though these, and more especially the Gold Coast, have been carefully explored.

Another large variety is the Lyre Antelope (*Euryceros euryceros*) called by the Liberians an elk. It resembles the koodoo, but its coat is of a reddish yellow, and the white stripes are more numerous than those of the koodoo. The horns are very strong and twisted so that the two taken together make the shape of a lyre. The tips of the horns are white for about a hand's breath. The antelope feeds on the leaves of trees and on the climbing plants, and reaches without difficulty up to a height of eight feet.

Elephants are often met with even near the coast, and in the Mandingo plain they are found in great herds. They are hunted, but not often killed, as Mr. Büttikofer concludes from the trifling amount of ivory exported.

A very curious beast is the Liberian river-horse (*Choeropsis liberiensis*), locally known as the sea-cow or water-cow. This is the dwarf among the hippopotami, the full-grown male measuring about 4 feet 7 inches in length and 2 feet 7 inches in height, and the female being still smaller. It is distinguished from the Nile hippopotamus, not only by its diminutive size and other characteristics, but by the fact that it has but two incisors in the lower jaw instead of four. The color of this uncommonly clumsy creature is, in the upper part of the body, a greenish blue-black, which becomes a gray-green on the sides and passes into a yellowish green on the belly. In its habits it resembles the hog rather than its namesake, though it does not live in herds, but wanders in pairs through the forest and with a very wide range, so that though known everywhere it is nowhere frequently encountered. It delights in the forest and the marsh, and takes to the water only when it bathes, or is obliged to cross a stream. Its habit of wandering over a wide area adds to the difficulties of the hunter.

It feeds on branches of trees and plants, and the fruits of the forest, and retreats after foraging, to sleep away a portion of the day in the swamps; and it sleeps so soundly, as the natives of St. Paul told Mr. Büttikofer, that the hunter can approach and kill it without any trouble. Its footprints are smaller and less deeply impressed than those of the elephant; and, where he has passed through the marsh, the hippopotamus leaves the broad track of his body on the surface. The flesh of this animal, especially when young, is succulent and resembles that of the wild swine.

The ant-eaters are divided into two classes, one living in the trees, the other altogether on the ground. The former are frequently tamed and live about the houses. When they are touched they roll themselves up in a ball like a hedgehog, and it takes all the strength of a man to unroll them. The ant-bear, (*Manis gigantea*), lives in holes in the ground or in an old ant-hill, and provides himself with an exit as well as an entrance, because he is too thick and clumsy to turn about in his hole. One of these creatures, killed at Cape Mount, was more than 5 feet long, and weighed 66 pounds.

There are 13 varieties of the monkey tribe in Liberia, and, when Mr. Büttikofer asked about them, he got everywhere the same answer: "Oh, Daddy, plenty live in this country, too much!" The chimpanzee, or *baboon*, as the Liberians call it, is held by them to be a creature of a higher order than other animals. It is killed now and then, but the natives, omnivorous as they are, do not eat its flesh; for the baboon, they say, "is too much like man." They have noticed, among other traits, that he walks erect, that, when he is old, he does not climb the trees, but provides himself with a club as a defence against attack, and that, in presence of a foe, he beats his broad breast with his clenched fists and roars so loud that, like the gorilla, he can be heard for a mile around. Emin Pasha's surprising report of the apes that made fires is approached in the following story, told to Mr. Büttikofer by an old hunter :

"You have certainly noticed," he said, "in going through the forest, those remarkable clear and open spaces, of which a man can give no account to himself. They are the baboons' fireplaces. It is the habit of the baboons to imitate men in every possible way, and in these places they gather dry wood together and pile it up in a great heap. Then one of the band makes as if he set fire to it, and the others begin to blow the imaginary flame, at first gently and cautiously, and gradually more and more strongly, until at last their tongues hang out of their mouths. Then they all squat down around the pile of wood with their elbows on their knees, and spread their hands out, as if before the blaze. And they may be seen sometimes in wet weather sitting patiently for half the day, in front of this imaginary fire."

A naturalist must frequently do violence to his own sentiments of humanity, but Mr. Büttikofer's account (Vol. I, pp. 236-237) of the way in which he secured a specimen of the monkey *Colobus ferrugineus*, is too much like a page out of Cumming's repulsive book. A number of these monkeys were enjoying themselves with chatter and play in the tops of the forest trees. Mr. Büttikofer and his guide were able, themselves unseen, to look on and admire the agility and cunning tricks, the petulance, the grimaces, the flight and the escape, suddenly arrested and often begun again, high in the air. But, as the narrator remarks, the hunter does not live by observation alone; he picked out his specimen and sent him a "morning salutation" from the gun. The smoke kept him from seeing the effect of the shot, but the guide said it had done its work, and would not have him shoot again. He waited fully ten minutes. The other monkeys had taken to flight at the report of the gun, and were heard crying and screaming to one another in the distance. The wounded one sat immovable on a branch with one arm around the trunk of the tree and his head bowed, as if he were asleep. "I knew this trick," says Mr. Büttikofer; "there are foxes, and even beetles, that lie as if they were dead, to get up and make off the moment they are unobserved. Another crack, and the hairy acrobat slipped a good way down the trunk. My companion sprang forward, but he was too hasty. The monkey caught all at once in another place, and sat there. I fired again, this time with my double barrelled gun, and brought him tumbling down from point to point till he grasped with one of his hands a branch, as he passed it, and there he hung, as many of his kind do in their last agony, and we had to wait till death relaxed his hold. The speaking, mournful look of a dying monkey's face, its reproachful and yet pleading glance, have always made a deep impression upon me, an impression which I have not even now forgotten, so that, during my second journey, often as the opportunity presented itself, I shot not a single ape, with the exception of one very rare specimen. I was glad, therefore, not to see the death-struggle of the poor victim of science, and waited patiently for the moment when he should fall to the ground. It was nearly an hour before we heard the branches crack, and then, with a heavy thump, the monkey lay at our feet." Like some other men, Mr. Büttikofer yields only to a strong temptation.

Liberia is divided into four counties, Mesurado, Grand Bassa, Sinoe, and Maryland ; the last founded as a separate colony in 1831, and incorporated with Liberia in 1860. The population is estimated at 1,068,000, of which number about 18,000 are of American origin, and form in fact the whole republic. One authority* makes the population nearly 2,000,000 ; and Mr. Büttikofer considers even the lower figure too large. He says (Vol. II, p. 78) : "All that is known with sufficient certainty is that the Colonization Society, during the whole course of its operations, transported to Liberia, in 180 voyages, more than 15,000 negroes and mulattoes, and that nearly 6,000 negroes, found on board of captured slavers, were landed there by cruisers ; so that if this imported population has kept up its numbers, it may now count about 20,000 souls."

It is to be remembered, of course, that the American Colonization Society never discontinued its efforts in behalf of Liberia, and that missionaries have always been present to maintain and to advance the tradition of civilized ways and manners among the settlers from America, overweighted at times by the unexpected addition of rescued slaves to be provided for, and always burdened with the responsibility of holding in check the frequently hostile native population. This population is in the tribal condition. Each little chief considers himself a king, to be dealt with as an independent power, and it is to the credit of the Liberians that they have maintained generally friendly relations with these fretful dignitaries. Actual collisions have occurred, but more have been averted by the show of force which the Republic has been enabled to make. Under the law every Liberian citizen between the ages of 16 and 60* is liable to military duty, and the armed strength of the country amounts to 3,000 men, divided into four regiments, one furnished by each county. Mr. Büttikofer was not impressed by the bearing of the troops he saw, when paraded to celebrate the national anniversary. He says it was not easy to refrain from laughter at the sight of them.

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* Consul-general Gudgeon, quoted in the *Almanach de Gotha* for 1891.

The day he arrived at Monrovia,† Mr. Büttikofer remained indoors till the cool of the evening, and then walked out with a friend from the Dutch Factory to view the capital. It is situated in a depression on the northern slope of the Mesurado promontory. The broad, straight streets lie parallel to the line of the hill-crest, and others cross them at right angles. The squares thus formed are occupied by a single house, or hut, with a *yard*, overgrown with rank weeds, out of which rises a cocoa-palm or, more often, a mango-tree. Every fifth or sixth house is in ruins from the ravages of the white ants (*termites*), and the impression made upon the new-comer, as he climbs the steep streets, is far from pleasant. There are neither horses nor wagons in Liberia, and the streets of Monrovia, where they are not occupied by outcropping masses of spongy laterite, are overgrown with grass and bushes, and serve as a pasture-ground for cows (very finely formed), short-legged goats, smooth-woolled sheep and black swine. Only the footpaths at the sides are kept a little clear of weeds. These features only add, however, to the picturesque effect. Many of the larger brick or stone buildings, and nearly all the wooden ones, are half hidden among the shadowing mango-trees, and in every lot stand singly, or in groups, cocoa-palms, guava, lemon or orange trees, and bushes grow in the window openings and the cracks of the walls, as in a ruined castle.

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* The *Almanach de Gotha*, 1891, makes the limit 50 years.

† The population of the city is about five thousand.

Among the public buildings is Representative Hall, on Broad Street, where the House of Representatives holds its sessions and the various Departments are established. Behind this is Government Square, with a monument to the Rev. Elijah Johnson, founder of the colony, and father of President Johnson. The Mansion House, the President's dwelling, is a handsome building on Ashmun Street. It was formerly the post-office, but this has been removed to a new building, near the coast. Another house on Ashmun Street accommodates the Senate, the Monthly and Quarterly Courts and the Masonic Lodges. In the rear of this house stands the Jail.

The principal churches are the Baptist, the Methodist, and the Episcopalian, the last a new building, to take the place of one destroyed some years ago by fire. A little removed from the city stands Monrovia College, on a terrace which commands a wide view of the open sea. The Consulates, German, Netherlands, American, Belgian and Swedish, are in the upper city. In walking through these streets, the traveller is astonished at the size of the private dwellings, hardly to be distinguished, but for the almost universal piazza, or veranda, from the houses of well-to-do people in Europe. Within, the drawing-rooms are often ample and cool, but poorly furnished ; and nearly all these buildings date from the prosperous days of Monrovia, when the immigration from America brought in a great deal of money. The commercial establishments, European as well as Liberian, are all on the northern side of the promontory, on the left bank, or *waterside* of the Mesurado River, a little above the point where it breaks through the sand-bank, or bar, and discharges into the cove at the base of the headland. This quarter is a scene of busy traffic all day long with the natives and the farmers, who come down from the interior in their canoes to exchange their produce for foreign goods. Every Saturday afternoon the business is at its height, and the salesmen, with all their activity, can hardly meet the demands of the chaffering, bargaining and capricious negroes.

Mr. Büttikofer was surprised to find that fresh beef was only to be had in Monrovia by subscription for so many pounds, though he readily perceived that the impossibility of keeping dressed beef in such a climate had originated the custom ; but he found it less easy to understand why there was no bakery in the town. In general, he remarks, life in the Liberian capital is primitive. There is no hotel, but rooms are to be had in private houses by visitors to Monrovia, and the members of Congress are lodged in this way when they come to the yearly sessions, in November. Most of the Europeans, and especially the Germans, are received by their fellow-countrymen. Mr. Büttikofer resided with a Dutchman, Mr. Aenmey, whom he describes as the only white man left in Liberia, since the death of Verdier, the French coffee planter, except those connected with the missions or the foreign factories. Mr. Aenmey is married to a Liberian wife, who owns a coffee plantation on St. Paul's River, and he himself does a general commission business. Mr. Büttikofer and his companion paid for lodging and breakfast, *for both*, one dollar a day.

There are social enjoyments in Monrovia, and Mr. Büttikofer shared in them with friends, whom he does not hesitate to name. At the German Consulate he met several members of Congress and the American Consul, a "genuine full-blooded negro, of herculean stature, and of the finest type, genial and cultivated, and a gentleman from top to toe." He took great interest in the naturalist's researches. There was a good deal of singing, followed by toasts in honor of the various nations represented.

"At first," says Mr. Büttikofer, "we drank beer, a very good Hamburg article, and then wine. The windows were open, but it grew warm in the room and not much less so in our heads. To cool off, we ordered brandy and water, the favorite drink in the tropics for reducing the temperature. I had just responded to a toast, and pulled out my handkerchief to wipe my forehead, quite forgetting that I had folded up in it a panther toad, that I had captured on the way to the Consulate, and this first of my specimens hopped out on

ASHMUN STREET, MONROVIA.

the table in a shameless fashion, amid the Homeric laughter of the company. The night was far spent before we took our leave."

The Monrovians looked upon the expedition to the interior as a very dangerous undertaking, especially for a small party, but Mr. Büttikofer adhered to his plan; and he says, very reasonably, that in zoological explorations in Africa, the disturbance and clamor inseparable from the movement of a large body of men, defeat the main object by alarming and scattering the wild animals.

In manner the people of Monrovia are pleasant and friendly, and Mr. Büttikofer remarked in the better society something of an aristocratic tone. It is the custom to make formal social calls in the cool of the afternoon, and the ladies study the fashions.

There is a fondness for associations, and six lodges of Freemasons are established, two in Monrovia and one each at St. Paul's River, in Grand Bassa, Sinoe and Cape Palmas. All are under the Grand Lodge of Monrovia. Temperance Societies were begun in 1882, and to their influence must be ascribed the passage of the law raising the duty on spirits to a point, which so affected the revenue from the customs that the law was soon after repealed.

The *Liberia Interior Association, Limited*, formed for the development of the back country, has nothing but its name to show.

These various efforts at organization, however abortive, are at least in the right line; but what can be more grotesque than the knightly *Order of African Redemption*, founded January 13, 1879? Mr. Büttikofer has "only this to say of it; that its insignia are well-finished, and that the Government has not distributed them with a lavish hand." There may be more than one reason for this forbearance.

The Liberians are Protestants in religion, but the Constitution guarantees freedom and equal rights to all forms of faith, and the withdrawal of the French Catholic Mission in 1887 was entirely voluntary. The fervor of the people in religious matters sometimes interferes with the other concerns of life. Mr. Büttikofer quotes the following passage from the Grand Bassa School Inspector's Report, of November 23, 1882: "The rainy season and the revivals break in upon some of our schools for two or three weeks, and the revivals so much the more that most of the schools are kept in the churches, and these are occupied on such occasions by the anxious inquirers, who spend their whole time there, praying, sleeping and dreaming, so that during this period the business of instruction is necessarily suspended."

Even with these interruptions, however, the Liberian schools are fairly successful, and the Liberia College in Monrovia has done good work, though complaint is made that its requirements are too high for the best pupils from the other institutions. Scholars are sent from Liberia to the American colleges and universities, principally for instruction in theology and in medicine; and medical men abound in the African republic. Scholarship and culture have always been represented, and Mr. Büttikofer assures us that he found everywhere an appreciation of music and song. To a full-fledged State, with its own order of knighthood, a National Anthem was indispensable, and a Liberian poet, Olmstead Luca, was found to produce it. Mr. Büttikofer prints the words and the music, which is better than the verses, of this composition :

All hail, Liberia, hail !
All hail, Liberia, hail !
This glorious land of liberty shall long be ours.
Though new her name,
Green be her fame,
And mighty be her pow'rs !

In joy and gladness, with our hearts united,
We'll shout the freedom of a race benighted.
Long live Liberia, happy land,
A home of glorious liberty, by God's command.

All hail, Liberia, hail !
In union strong, success is sure,
We cannot fail.
With God above
Our rights to prove
We will the world assail.

With heart and hand our country's cause defending,
We'll meet the foe with valor unpretending.
Long live Liberia, happy land,
A home of glorious liberty, by God's command.

The town life of Liberia has another centre in Harper, the sea-port near Cape Palmas. Dr. Nachtigal's grave is still shown at this place. He died on board the German man-of-war *Möwe*, April 20, 1885, on the homeward voyage from Kamerun, and his body has recently been removed to that colony.

The plantations and farms in Liberia do not extend, for the most part, to any great distance inland, but keep close to the neighborhood of the towns and stations, and along the streams. The houses and outbuildings are all of wood, and whitewashed, and they are raised above the ground on posts from 4 to 6 or 7 feet in height.

In general appearance they resemble the ruder houses of the Southern and Western States of America. The sides of the buildings are made of unplaned boards, nailed across the frame, and the roofs are covered with heavy shingles. The doors and the window-shutters are of rough boards, and, except in a very few instances, there is no such thing to be found as window-glass.

The furniture is of the simplest; a few plain chairs, a rocking-chair, a coarse table, one or two chests, wide bedsteads with hard mattresses, make up the list, to which may sometimes be added a cheap looking-glass and a few prints, with or without frames. A clock is rarely seen, even in the town houses, and it is not often needed in a land where the sun rises and set at 6 o'clock, all the year round, and is directly overhead at midday.

The returns of the commerce and revenue of Liberia for 1883–1884—the latest attainable—show an export of 931,341 gallons of palm-oil, 429,667 pounds of coffee, and 130,131 pounds of India-rubber. The revenue for 1883–1884 was 174,014 dollars, and the expenditure 157,465 dollars. According to the *Statesman's Year Book*, for 1889, the value of the Liberian exports for 1883 was £200,000 ($1,000,000), and that of the imports £150,000 ($750,000). The estimated revenue for 1888 was £35,000 ($175,000), and the expenditure £33,000 ($165,000).

The entire back-country of Liberia and some parts of the coast are possessed by the native tribes. The most important of these are: the VEI, in the Grand Cape Mount district, between the Manna and the Little Cape Mount River; the DEH, between the latter and St. Paul's River; the GOLA (or Gura), a powerful tribe on the middle St. Paul's River; the MAMBA, behind Monrovia, and between the Mesurado and the Junk River; the QUEAH, to the eastward, on the Du Queah River; and the great tribe of the PESSY, whose country is behind the region occupied by the two preceding tribes. The country of the BASSA is bounded on the south-west by the sea, on the north-west by the Farmington River, north-east by the river Sangwin, and towards the interior by the GIBI, and other tribes. The KRU district, the home of the *Kruboys*, so well-known on the Guinea coast, stretches from the Sangwin to the Grand Sesters River. Next to the Kru, and occupying the coast from Cape Palmas to the San Pedro River are the GREBO, closely allied to the Kru in speech and in blood, *Grebo* being the name by which the Kru are known among themselves.

The Kruboys are good seamen, and in demand for wages of six dollars a month, and expenses; the latter being the cost of three pints of rice and a little grog, daily. They are hired through a head-man, who requires a document in writing (known on the Guinea coast as a *book*) as proof of the contract, and pockets as his commission the whole of the first month's wages, paid in advance. In the Liberian ports these contracts are made with a Government officer, whose duty it is to see that they are not made use of to cover slave-dealing, or other illegal enterprises. Some years ago, according to Mr. Büttikofer (Vol. II., p. 192, *note*), President Johnson refused to allow the captain of an English man-of-war to engage Kruboys, who were to be employed in military duty in Egypt. An agent of the Panama Canal Co. was, however, permitted to hire natives of Liberia for service under the stipulation that, when their engagement expired, they should be sent back to their home; a stipulation faithfully kept, it is added, "in so far, at least, as the men lived to come back." Similar engagements of Liberians and of tribesmen have been recently made for work on the Congo railroad, and other enterprises in the Free State.

The *book* plays a most important part in the daily life of the Liberian workmen. It makes no difference whether the man himself is able to read; he is perfectly contented when he sees the agreement put down in writing, and he calls everything written a *book*, even a bit of a newspaper. He preserves all these *books* with the greatest care, and can tell accurately the meaning and date, as well as the value, of each one.

The Krumen have the genuine sailor's contempt for landsmen and their ways, and leave all the house and field work to the women and children, and the slaves. They make and repair their own canoes, however, and with wonderful skill. They are generally well dressed and fond of bedecking themselves with finery, such as the cast-off coats of English naval officers; and they delight in carrying an umbrella. Individually, they are known by the nicknames bestowed upon them by the English seamen: *Half a Dollar*, *Pea Soup*, *Bottled Beer*, *Flying Jib*, etc.

The greater part of the Liberian negro tribes are under their own princes or head-men, with numerous inferior chiefs exercising authority under the supreme head. These chieftains, no matter how limited their power, assume the title of king, in imitation of their superior, and the more eminent among them are, in fact, quite equal in influence to the actual king, in time of peace. The king maintains no standing army, and does not surround himself with a retinue of courtiers and attendants, such as wait upon the princes in other parts of Africa. The conditions of his life are, on the contrary, rather mean in the eyes of Europeans. He exacts no universal tribute from his subjects, and his riches consist in the number of his women and slaves. In war-time, however, there is no limit to his authority, and other war-lords might envy him. Simple and unpretentious as he is at home, every little chief makes the greatest possible parade when he sets out on a journey, with his high councillors and life-guards, and a bevy of women, dressed in their gowns and ornaments. The men are armed with long swords, mostly old European cavalry-sabres, horse pistols, and daggers, often beautifully finished, of native manufacture. Every one, from the king down, wears his pocket handkerchief round the middle, under his toga, and all go barefoot.

On the death of a chief, his dignity descends to his eldest son, unless the deceased leaves a brother. In this case the brother becomes king, and it is not till his death that the succession devolves upon the son of the former king.

War is carried on among these tribes in guerrilla fashion and hardly ever in the open field. Their operations are confined to night-attacks and incursions, with destruction of the places they can set on fire ; though it sometimes happens that siege is laid to a fortified position, such as the residence of a chief. These residences are often surrounded by palisades, or high, thick walls of clay, baked in the sun.

The incursions take place when the rice is ripening; and spies, called *softly men*, are sent in to report upon the district marked for attack; a dangerous service, for they are killed without pity, when discovered.

Polygamy is practised, and a rich man is known by the number of his wives and slaves. Mr. Büttikofer has known chiefs, who had 20, 30, and even 50 wives; but in every such number there is always one, who is known as the *head-woman*, and is superior in dignity to the others. Slaves are not badly treated, but are regarded as members of the family to which they belong, though the master readily sells them on occasion, as, for instance, to raise money to pay a debt.

The average price of a slave is 15 dollars, and no one would think of paying more than 20 dollars.

A chief frequently possesses many hundred slaves, mostly engaged in cultivating the soil, and settles them in a village by themselves. One such village is Toöcoro, on the Morfi River, the property of a Mr. Cole, who was himself originally a slave, but has become a land owner.

The native handiwork in leather, pottery, ornamental work and arms, shows a great deal of skill and taste, and something of the Oriental eye for contrasts of color. Mr. Büttikofer's judgment on the character of the negroes is that they are children of the moment: "It is according to the present circumstances that they are good or bad, willing or obstinate, honest or thievish, true or false; and it is best, in a word, always to show that you are on your guard and hold them steadily under sharp control." (Vol. II, p. 297.)

Many of these natives have received instruction in the Mission Schools, but the result of the efforts to civilize them is not encouraging, so far as Mr. Büttikofer was able to see. When the negro leaves the Mission School it is with no thought of bettering the condition of his people. He lays aside the clothes he has been taught to wear, ties a handkerchief about his loins, and goes back to the old ways. With some inconsistency, Mr. Büttikofer declares on the next page (Vol. II, p. 346) that these very natives are as full of promise as the white men :

" It frequently happens in America at the present day that these young Africans take the doctor's degree, and I am almost entirely convinced that the negro is not less capable of culture than the white man, as soon as the opportunity for study is given to him."

The pagan faiths of the Guinea coast are still what they were in the time of Dapper, whose accuracy is highly praised by Mr. Büttikofer. Of the two religions that press upon this native paganism, Mr. Büttikofer says (Vol. II, pp. 340–341) : " The efforts of the American missionaries have no very brilliant results to show, for the natives have remained almost indifferent in their attitude towards Christianity. Islam makes greater progress, and presses forward slowly, but steadily, from the interior to the coast. The Mandingoes of the broad *hinterland* are all Mohammedans, as are also, in great part, the Busy and the Pessy tribes ; but Islam has not yet a firm foothold among the jealous and exclusive Golah and the others of the Deh family, and particularly among the Vei." The change to the faith of Islam is made very easy for the fetish-worshipper. He has only to renounce the indulgence in strong drink and the eating of unclean flesh; and the Mandingo dervish is satisfied when he brings the unbelievers to acknowledge the true religion, and to exchange their own unsightly fetish-amulets for the more elegant and far more efficacious talismans which he offers.

The Mandingoes are much more scrupulous in the observance of the duties prescribed by Mohammedanism. Their attendance at the mosque is regular; they repeat their prayers and perform all the rites enjoined. In all their towns and larger villages there are schools, in which the boys are instructed in religion and in the reading and writing of passages from the Koran. There are among them not a few learned men, who possess a number of Arabic manuscripts and give lessons to young men, so that the knowledge of the Arabic language is very widely spread.

Schools of a similar character are conducted, also, by the dervishes, who are the pioneers of Islam in the movement towards the coast, and settle themselves in the larger communities among the other tribes, such as the Vei, and there carry on the work of proselytism in the measure of their power. The same process goes on among the Busy and the Pessy. The Mandingo priest, once fairly settled, takes to himself a wife. She is soon followed by a second, and then, with the growth of his school, the priest calls in an associate, who must also have a house. After him come in by degrees blacksmiths, leather-workers and other handicraftsmen, who give employment to the people of the tribe, and build up in this way one settlement after another, till the community is so large that a special building is required and is dedicated as a mosque.

Mr. Büttikofer thinks that the Mandingoes must be regarded as the practical lords of the land.

The Christian missionary work has two aims: the maintenance of religious faith and civilization among the Liberians, and the conversion of the heathen.

If but little has been done in this latter direction, it must be remembered that great and peculiar difficulties are to be encountered. Mr. Büttikofer shows how the well-founded hope of attracting the natives to civilized ways by the education of their girls has been defeated by the social customs of the tribes. A girl represents in the family a certain money value, and is disposed of in marriage by her parents to the man, often a polygamist, who can pay the required amount.

In this way the time and labor bestowed upon the Christian education of a native girl are found to have been wasted. To meet this evil the Protestant Episcopal mission adopted a system of purchasing the girl by a payment of 15, or more, dollars, to secure the right to give her in marriage to a Christian; but means were lacking to give development to this system, and the missionaries had to endure the grief of seeing a girl of excellent promise withdrawn from their care by her parents, and handed over to a pagan who was rich enough to refund the money advanced to secure the girl's freedom.

"It is to be understood, of course," says Mr. Büttikofer in his conclusion (Vol. II, pp. 344–345), "that it cannot enter into my purpose to draw a parallel between the two rival monotheistic religions, or to prognosticate which of the two is to control the future of the black fetish-worshippers; but the unprejudiced observer, who follows the vigorous expansion of Islam in the inner country, and contrasts with it the proportionately feeble results of the Christian missionary activity, must soon come to a clear determination on this point. It is not to be doubted that the Mohammedan religion also exercises a civilizing influence upon the natives.

"It is certain, also, that it suits them, for, together with its great simplicity, it permits polygamy and sets before them the well-known sensual joys of Paradise.

"'God is God, and Mohammed is the prophet of God.' Even the dull intellect of the negro can take in this clear and simple principle, while on the other hand it is hard for him to form a definite conception of Christianity, with all its involved dogmas. Nor is it to be wondered at that the negro remains indifferent to Christianity, in so far as it brings him no material advantage, and least of all that he is not won over by its rigidly ascetic view of life, and its monogamy. Much depends, moreover, upon the method of presenting Christian doctrine to the heathen. It is nothing less than perverse to hammer at the negro with a lifeless theology, as is even yet done in many a place, and to seek for salvation in the making of proselytes and the winning of souls."

Mr. Büttikofer might have uttered himself in other language if it had been his purpose to compare the two religions; and he would approve, at least in part, the distinction between them set forth by Dr. Blyden, himself a negro, and a clergyman:

"Mohammedanism, in Africa, has left the native master of himself and of his home; but wherever Christianity has been able to establish itself, with the exception of Liberia, foreigners have taken possession of the country, and, in some places, rule the natives with oppressive rigor."*

Mr. Büttikofer, a disinterested observer, looks to an immigration from the United States for the supply of the new blood imperatively called for in Liberia. Dr. Blyden has an abiding faith in the saving power of the Christian civilization already planted, and its eventual supremacy over the tribes of the interior.

It cannot be believed that there will be an emigration from the United States to Liberia, for the colony exercises no attractive influence upon the Americans of African blood. The sentiment which founded the American Colonization Society has spent its power. The times are changed and the American negroes are changed with them, nor would it be easy to find many who cherish the thought of Africa as their fatherland.

While it is true that Liberia has made no effort to extend its rule or to assert its authority over the native tribes, this negative attitude is even more due to inherent weakness than to the Christian spirit of the Republic. It must be admitted that there is a lack of vitality in the civilization which maintains, for a total population of 20,000, a college empowered to confer degrees for scholarship in Greek and Latin and Arabic, while there is neither a road nor a paved street in the whole country; and those who are interested in the Liberian experiment may well look forward with misgivings to the arrival of the conquering Mohammedans at Cape Palmas and Monrovia.

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* *Christianity, Islam and the Negro Race*, p. 354.

NATIVE COPPER OF MICHIGAN.

BY

E. B. HINSDALE.

Few people have any knowledge of the native copper of Michigan, what it is, where it is obtained, or how it is procured and prepared for market ; nor is the magnitude of the industry understood. Last year there were produced 105,586,000 pounds of refined copper, which, at 17 cents per pound, about the price of copper at this writing, would amount to the sum of $18,045,620. It is a rapidly-growing industry, and the new openings and additional machinery, now fast getting ready for operation, point to an increased production of at least 20 per cent. in pounds of copper for next year.

About $250,000,000 in value have been taken from these famous mines, and yet no one suggests a probable limit to the supply or dares predict the extent of the possible future development of this great industry. Native copper is so called because each particular piece of copper as it is mined, whether it be many tons in weight or a fine particle of dust, is pure copper of the same kind and quality as the ingot copper of the world's markets. It is not alloyed with any other mineral, except it carries a trace of silver, and pure silver in small quantities is often found imbedded in it.

It was this purity of the metal that made these mines an object of interest to an ancient people, who discovered and worked them extensively in some prehistoric age. Those who look at a map of Lake Superior will see a peninsula called Keweenaw Point, that juts out into the lake from the southerly shore in a northeasterly direction. It is a wee, small bit of land in this world to contain so much wealth and to possess so much romantic interest. These famous mines are situated along a line about in the middle of this peninsula, running from south-west to north-east, and copper has been found at various points along this line for about fifty miles. Ancient works have been found at numerous points for about thirty miles.

There is a deep mystery about these old works that it is impossible to fathom. In the opinion of many, they were worked by a race of men that preceded the Indian races found here when Columbus discovered this continent; but others think that they were worked by the ancestors of the Indian races here when white men first penetrated this then far-distant country. This question can never be conclusively settled. This much is certain, that, whoever worked these mines in ancient days, all knowledge of the existence of the mines was gone from the Indians when white men rediscovered them.

These ancient miners were a diligent and persistent people. They seemed to know nothing of smelting copper, for there are no traces of molten copper. They were after pieces of suitable size to work by cold hammering into useful articles and ornaments. They understood the use of fire in softening the rocks to enable them to break away the rock from the masses of copper. They knew nothing of drilling or blasting, but used the stone hammer freely. More than ten cart loads of stone hammers were found in the vicinity of the Minnesota mine. One of the larger class weighed thirty-nine and one-half pounds, while smaller specimens weighed five or six pounds each.

These stone hammers have a crease around them, obviously for a withe handle. Such handles are made of tough saplings or small trees, that will bend around the stone and, when firmly bound in their place by strips of strong bark, make a hammer about as effective as a modern blacksmith's sledge hammer. Ashes and wood coals have been found on the rocks at the bottom of the working, showing the use of fire to prepare the way for the effective use of the stone hammer. These mines must have been worked for centuries, judging by the extent of the works.

In one place the excavation was about 50 feet deep, and at the bottom were found timbers forming a scaffolding, and a large sheet of copper was discovered there. In another place in one of the old pits was found a mass of copper that weighed forty-six tons. At another point the excavation was twenty-six feet deep. In another opening at the depth of eighteen feet a mass of copper weighing over six tons was found, raised about five feet from its native bed by the ancients and secured there on oaken props. Every projecting point had been taken off by these people, so that the exposed surface was smooth.

Wherever the ancients found copper from a few pounds weight to a few hundred pounds in weight they were obviously able to utilize them, but the large masses were too heavy for them to handle. Their habit was to throw the broken stone behind them as they progressed with their works. Many of their workings are ten feet or less in depth. The copper obtained by these people was wrought cold into axes, chisels, knives, spear heads, arrow heads, bracelets, buttons, beads, etc. It has been observed that very few of these articles are found near the mines.

There is a piece of low arable land a few miles from the mines, near the mouth of a small stream that runs into Keweenaw Bay, which the old miners probably used as their camping ground, for here has been the principal find of ancient tools on Keweenaw Point. These copper tools have been frequently found in the old earthworks in Wisconsin, Ohio and Canada, and the writer thinks that he has read of their being found further south in the Mississippi Valley. There are no human remains found near the workings nor evidences of human habitations.

The extreme severity of the winters and the absence of any evidence of permanent occupation has led many to suppose that the ancient miners migrated from some warmer climate in the spring and returned in the autumn, perhaps bearing their dead away with them. Whoever they were, whatever their habits were, many centuries have passed since they last worked these mines. Their trenches and openings have become filled up, or nearly so. Monstrous trees have grown over their works and fallen to decay, other generations of large trees have grown and perhaps fallen and decayed; how many, no one can tell. All that is known is that when the mines were rediscovered decayed trunks of large trees were lying over the works, with a heavy growth of live timber then standing on the ground. Over one of these works in the Minnesota Mine, Mr. Knapp reports that a hemlock tree which he felled showed 395 annular rings.

The desire to fix a time when these old works were closed is intense, but cannot be gratified. It would be curious to compare the civilization of Europe with that of these people at the same time, if we could fix the date. What was Europe doing when these stalwart men of the northwest were swinging those tons of stone hammers in a no mean effort to accomplish a feat of mining, that would have been creditable a few years ago to our boasted civilization?

Had Columbus pointed the prow of his ship to these shores at the very time these men were industriously working these mines, or had the forest trees then grown over them? Dates would be interesting, but they cannot be established. Of one thing we are certain, a great modern industry has been, or, more properly speaking, is now being, built upon this ancient industry.

The Jesuits who visited this country about two hundred years ago learned from the Indians that there was copper in the country. Claude Allouez, who visited Lake Superior in 1666, states that pieces of copper weighing from ten to twenty pounds were frequently found by the savages. Pieces of copper that have been carried by the convulsions of nature from their original bed are found many miles from the copper veins. In 1864 a mass weighing about eighteen tons was found loose on the drift covering the rock near Portage Lake.

A copper rock now on the Government grounds in Washington has a strange history. It was brought from the banks of the Ontonagon River. It is supposed to have been removed by the ancients in some way to the banks of the river, and, in an attempt to raft it over, it got away from them and sank to the bottom. When the water was low it projected above the surface and was an object of religious veneration. It is said to have been known for over 200 years. The Jesuits heard of it from the Indian priests, who, however, refused to conduct the missionaries to the spot where it lay, on account of a superstitious belief that when the white men had seen it the Indians would be destroyed: a belief not without reason.

In 1820 General Cass sent a party of men to fetch the rock away, but, owing to its great weight, they did not succeed. Another attempt was made to remove it in 1827, but as the river was high and it was pretty much covered with water, this attempt failed. In 1842 another attempt was more successful. It was removed to the mouth of the river. A Mr. Eldred claimed to own it. It was afterwards claimed by a Government agent, and finally removed to Washington. By act of Congress Mr. Eldred was paid $5,655 for it.

The first attempt at mining within historical times was in 1771, but the location was not skilfully chosen and it was a failure. It was not until the report of Dr. Douglass Houghton, State Geologist, in 1841, that there was any public knowledge of native copper in place on Keweenaw Point. This report awakened great interest in this country, and explorations and developments have gone on with generally increasing interest to this date. A history of the early struggles and trials of those who took part in the development of this country would be exceedingly interesting. It is a pity the task is not undertaken by some competent person before death has removed the last of the actors who could tell the tale.

It was not until 1844, after the Indian titles were extinguished, that mining began in earnest by white men. Hundreds of companies were unwisely organized. Speculation was rife. Works were begun under great difficulties, and knowledge of mining was limited. Capital was also limited. The usual result followed—a grand collapse—in 1847. Disappointment and failure were general, with some notable exceptions. The methods of mining then employed were primitive. The country is full of abandoned works, and many of them are now being reopened with fresh capital.

In the early days the mining was, in some of its methods, not unlike those of the ancient miners ; but some modern ideas were introduced. Drilling, blasting, and stamping in a crude way were employed. In all cases, except where large masses of copper were found, the ore was roasted in burrows. These were formed by layers of wood and layers of ore. In the roasting process care was taken not to have the fire hot enough to melt the copper. The large pieces of copper were sent to the smelting works, the smaller pieces of roasted ore were stamped and washed, and the resulting copper was put in barrels and sent to the smelter. This was called " barrel work."

The masses of copper found in the earlier days have not been equalled in size in later years. In fact, large masses of copper are not as profitable to find, owing to the difficulty and expense of getting them out and cutting them up. Among the numerous masses of copper, the most notable was found in the Minnesota Mine, in 1857. It was difficult to dislodge it from its native bed. Charges of powder, first of 125 pounds, gradually increased to 550 pounds, failed to dislodge it. Finally a charge of 750 pounds, securely tamped under it, was fired, with the result of lifting from its bed without fracture a mass of copper 46 feet long, 18 feet in breadth, and 9 feet thick, the latter two measurements being taken at the greatest distance, the whole mass weighing about five hundred tons. In cutting it up fifteen tons of chips of copper were made.

In the early days of mining there was great difficulty experienced from the isolation of the country and want of transportation facilities. There were no railroads or telegraphs, and the only means of transportation was by water. All supplies for men and animals had to be brought up before navigation closed. The winters were long and severe. When once the cold weather began the people were as isolated from the rest of the world as the Laplanders. For from six to eight months they had little or no communication from "below." An occasional mail would be brought in by hardy adventurers on snow shoes, with dog trains.

One of the pioneers related to me that the news of the first President Harrison's election in November, 1840, and of his death the following April, came in the same mail about two months after his death. With all their trials and deprivations those who wintered here had many social enjoyments and much real pleasure. There was much good society among those in charge of the works, and innumerable stories are told of the good times they had in the old days of forty years ago.

In those days men walked ten miles on snow shoes to make New Year's calls. A short neighborly call would usually last at least a week.

All this is changed now. Railroads, telegraphs, telephones, and electric lights and a greatly developed industry have inaugurated a new era. The theatre of principal mining interest has changed. The greatest mine for many years has been the Calumet and Hecla. The development of this mine began about 1867. Its progress has been wonderful, and to-day it ranks as one of the greatest copper mines in the world. Its works are situated on what is locally known as the Calumet and Hecla Conglomerate.

This is a vein at its mine of from six to twenty-eight feet in thickness, generally carrying copper interspersed through the rock, the larger pieces, with rare exceptions, usually weighing only a few ounces and from that of all sizes down to dust as fine as gold dust. No very large masses of copper have been found, none worthy of notice compared with those before referred to. It is the universality of the small pieces of copper through such a vast quantity of rock that makes the marvellous wealth of this mine, although in their explorations the workmen have found long stretches of rock too lean to be worth milling.

In some of their shafts paying rock has been found near the surface. They were fortunate in opening such shafts in very rich rock near the surface in their early days, which gave the company its financial strength, enabling it to pay good dividends and push explorations. The shafts extend for about two miles along the vein, and are fourteen in number. Many of the shafts have been sunk to a great depth before finding paying rock. One of the latest explorations descended 2,300 feet before paying rock was found. All of the shafts have found paying rock when pushed deep enough, and all are richer at their greatest depth than at the surface.

A study of these results as well as the results at other mines, has led to the conclusion that the most profitable mining is to be found at great depths. The method of mining by this company up to this writing has been to sink their shafts down on the slope of the vein. Captain Daniell, one of the ablest miners of that country, who has been for twelve years in charge of the Osceola Mine, reasoning out the probable course and character of this wonderful vein, backed by abundant capital, inaugurated a bold and original idea of mining. Selecting a location beyond the lands of the Calumet and Hecla and above the vein he calculated that a perpendicular shaft should strike the vein at a depth of 2,300 feet. It was a bold enterprise to go out into the open country and lay out the work upon land that showed no indications of copper at the surface, and enter upon a labor of years to find a vein of copper, the continuity of which was unknown except by logical reasoning, from the surface openings of the Calumet and Hecla mine.

What freaks of nature in the bowels of the earth might defeat his logic no man could tell. Patiently year after year the work went on, and at the end of three years and four months the expected vein was found within thirty feet of the expected depth. The result was the opening of the famous Tamarack Mine, which, with other mines now opening by the same men, bid fair to rival the Calumet and Hecla. The Tamarack Mine has been in successful operation for four years.

Encouraged by this success, a second shaft has been sunk on the same location, which has just come into successful operation (August, 1890). The vein, where pierced by these two shafts, is of the same general character as that in the Calumet and Hecla. On another location the same company has sunk two shafts to a depth of 2,300 feet, but do not expect to reach the copper until November next at a depth of about 2,500 feet. A third mine of two shafts has been commenced on still another location, that has attained a depth of only 500 feet, but is expected to be sunk about 3,800 feet before reaching copper. These are bold departures from the traditional method of mining in this country, which heretofore had been to sink on the slope of the vein.

Within about two years ago the Calumet and Hecla commenced an enormous vertical shaft, intending to cut the vein on their land at a point below their present workings at a depth of about 3,700 feet. It will take nearly two years before this shaft can reach the vein. It will be interesting to note the result of all these unfinished works. If the calculations of their projectors are not at fault, they will put into the shade all past achievements in copper mining in this country.

Modern methods of mining and milling have made great advances over old methods. The rock is no longer roasted. That method was abandoned years ago. Black powder has been superseded by high explosives that throw down much larger masses of rock. The hand drill has given place to drills driven by compressed air. All the rock is stamped in mills of great power. In 1860 a report was made of a mill that stamped thirty-three tons per head per day. Now a single head will stamp 260 tons per day.

The method of procedure is to raise the rock to the surface in such lumps as it is left in by the blast in the mine. Here the large pieces are put through stone crushers that break it into lumps not larger than a man's fist. It is then dumped into cars and taken about four miles to the border of a small lake, where it is stamped and washed, a process called milling. After the earthy matter is worked out as far as practicable, it is sent to the smelter, where it is cast into the various forms of copper required in the markets of the world.

It is difficult in a few words to give an idea of the magnitude of these operations. The details would be tiresome. A few facts will serve in some measure as indices to lead the mind to comprehend the subject. The people who live almost together upon the group of mines, of which the Calumet and Hecla is the principal one, number about 12,000, all of whom are either directly or indirectly supported by the mines. About half as many more are supported around the mills and smelting works.

All the mines have to pump water up to their mills to wash the earthy matter from the copper. The amount of water pumped daily by the Calumet and Hecla to its mill is about thirty-four millions of gallons, a good supply for a city. But more than this, this company has nearly completed a pump that will throw about fifty millions of gallons a day, or an amount in excess of half the water supply of the great city of New York prior to July, 1890. The dividends this company has made to its stockholders exceed $35,000,000. It is only by such comparisons that the mind of the general reader is brought to a comprehension of these great works.

The amount of sand washed into the Portage Lake became so great that it threatened to stop navigation, and the United States Government has had to interfere and prevent further use of the lake. Many acres of made land are now in the lake from these washings. At present most of the mills are on Torch Lake, but the time will come when Lake Superior will have to be the dumping ground.

The Calumet and Hecla sends daily to the smelting works about 135 tons of mineral, as the copper is called after stamping and washing, which, when smelted, will produce about ninety-five tons of pure copper daily. The greatest depth of the Calumet and Hecla is over 3,000 feet, and the greatest depth of the Tamarack is about 2,850 feet. These two mines, the greatest producers, are selected by way of illustration. Proper limits forbid further details in this paper, although the operations of the Quincy, the Atlantic, the Osceola, and others would be interesting.

The native copper of these mines is the only considerable body of such copper yet found in the world. The character of the mine improves, the greater the depths to which they are worked. In this respect this district is different from many others. The Cornwall mines of England, as they went down, gradually changed to tin mines. In Montana the mines are of decreasing value when worked below the water level of the country. The Chilian mines, that once dictated the price of copper for the world, can no longer be worked with much profit, and are not a serious factor in the market. The native copper of Michigan has more tensile strength and greater conductivity for electrical purposes than any other. It commands the highest price in the market for its better adaptability for many kinds of manufacturing purposes.

In the deep mining of this country no particular change is noticed in the temperature of the mines as they go down. Water is not encountered in troublesome quantities. The veins seem to be almost hermetically sealed. These are all favorable conditions for mining. A striking feature of these improvements is the ponderous machinery, engines, pumps, stamps, and fly wheel, as fine as any in the world, housed in large brick and stone buildings with iron roofs. All this in a place where the "forest primeval" stood in its solemn stillness thirty years ago. The trees were of phenomenal size and the sunshine hardly penetrated their close and tangled growth. Even now the stumps have to be grubbed out to make way for advancing improvements.

Such are the Lake Superior copper mines as they appeared to me in my leisure hours of outing in 1890. Great as have been their strides in the past, it seems to me that the men in charge are just beginning to understand the business and country. Wonderful as the improvements have been, others are to follow. Advanced thinkers are looking forward to the time when electricity will come to their aid to drive their drills and perhaps light these subterranean caverns. The time will also come when a limit will be reached for hoisting by steam power from the surface.

When I suggested this difficulty to Captian Daniell his quick response was : " Electricity can be used to bring the ore within reach of a surface hoist." At the suggestion of expense he said : " That is not a very material factor." His answer suggested large thoughts of future possibilities. It is refreshing to get away from the rut of metropolitan life and be with men who are doing the really big things in this world, stalwart thinkers who form great plans and patiently carry them out. Whenever a just estimate of the really great men of the land is made up, a successful mining captain or superintendent will hold no mean rank.

August, 1890.

SIR JOHN FRANKLIN'S LIFE, BY CAPTAIN A. MARKHAM, R. N.

The Editor of the BULLETIN.

SIR :—I have so far abstained from attempting to publish any notice of the above book in the papers, because for some time past their columns have been crowded with more interesting matter, and also because I waited to see if any one else took up the subjects I desired to touch upon.

I now adventure to hope that you may kindly grant me space for a brief examination into and correction of two or three statements in this biography, with which my name and Arctic explorations are more or less connected.

At page 199, we are told that " Dease and Simpson also explored the southern shores of Wollaston and Victoria Lands."

To this I reply, that Dease and Simpson never even saw, far less explored, any part of Wollaston Land. This land was seen at a distance of from 30 to 40 miles by Dr. Richardson (late Sir John) in 1826 and named by him, and was carefully searched and surveyed by me on a sledge journey in 1851 when employed in the Government service to look for the Franklin expedition. A journey of over one thousand miles at the average rate of 24 miles a day, I myself hauling a light sledge of from 50 to 60 pounds weight nearly all the distance. Dease and Simpson did see and roughly explore in 1839 about 140 miles of Victoria Land, lying between longitudes 105° and 110° West. All the rest of the coast was examined closely by me in the sledge journey already mentioned, and on a very long boat voyage, during which I also examined and named the west shore of Victoria Strait up to latitude 70° 15′ N.

On the same page 199, Markham tells us that "The entire North American Coast has thus (in 1839) been delineated."

In the above line this careless, or possibly designing, author, crowds into the briefest possible space a complete misstatement of facts, perverting, if allowed to pass unchallenged, a rather important part of the history of Arctic exploration, for which he is liable to the accusation of culpable negligence; the means of putting himself right being easily within his reach at the library of the Royal Geographical Society, had he wished to inspect Simpson's narrative and chart.

Hear what Simpson says on his reaching the extreme east point of his voyage at the Castor and Pollux River (94° 14′ West Longitude) in the autumn of 1839—*page* 377: "We could hardly doubt having now arrived at that large Gulf uniformly described by the Eskimos as containing many Islands, running down southward till it approached within 40 miles of Repulse Bay. The exploration of such a Gulf to the strait of the Fury and Hecla would necessarily demand the whole time and energy of another expedition." So much for this author who writes at random! Apart from this, Simpson's conclusions—by which he made Boothia an island—were wholly in error, as I proved beyond a doubt in

1847, and again in 1854, by walking over about 70 or 80 miles of land from east to west (connecting Boothia with America) which Simpson reported as sea. Had he been able to go 4 or 5 miles east of the Castor and Pollux River, he would have distinctly seen the land extending north of Boothia. If Markham's statement had the slightest foundation in fact, what was the use of the Hudson's Bay Company's Expedition of 1846–47, the whole object of which was to unite Dease and Simpson's discoveries or those of the Ross's on Boothia, with Parry's Fury and Hecla Strait? Finding Simpson wrong, I did the latter. Then in 1854 I united Simpson's survey with that of Ross, west of Boothia. Thus nearly 800 miles of the 1,000 left unexplored in 1839—Markham's absurdities notwithstanding—were completed by me, but there still remained about 200 miles, between Bellot Strait and the Magnetic Pole on the west shore of Boothia, a blank on the charts, and these were explored by McClintock in his memorable sledge journey in 1859, just 20 years after the date fixed by the author of "Franklin's Life," as that on which the whole coast of North America had been "delineated" by Dease and Simpson.

But this is not quite all. Mr. E. G. Ravenstein, who manufactured the chart of "Arctic American progress of Discovery," which is attached to the "Franklin Life," has given the greatest and noblest of Arctic Navigators, Parry, the credit of having explored the west shore of Melville Peninsula, although neither he, nor a single member of his officers or crew, ever saw a mile of it.

How this came about is as follows: Parry entered on one of his charts (see narrative of his second Arctic voyage, 1821–23), a simple line—not shaded—as his own surveys on the same chart are telling us that it was a tracing of the west shore of Melville Peninsula from Eskimo information. No Hydrographer or Geographer was, during a period of sixty-seven years, foolish enough to imagine, that this line indicated a survey of Parry's expedition, for not a word was said about it in his journal, where it certainly would have been the greatest thing in sledging done by this great crowd of 100 or 120 blue jackets, for, as far as I can make out, the whole lot, although aided by some splendid teams of dogs, made no single continuous sledge journey over 200 miles in length ! ! during the two springs they passed at Melville Peninsula.

On my exploration of the West Coast of this Peninsula in 1847, by a very arduous journey over ice, I found the Eskimo tracing, above referred to, over seventy miles wrong in Latitude at its southern end, and at another part a degree and a half of Longitude in error, yet it was on this incorrect tracing that Ravenstein founded a claim to deprive me of three hundred miles of my survey, to remove my name from Melville Peninsula, where it had stood unchallenged for many years, and make a gift of it to a Naval Officer of great merit, but who, as I have already said, had neither himself nor any of his people seen a mile of the coast named. Had that noble officer been now alive he would have scorned to accept such an ill-begotten and false a gift.

There is much in this Biography that is quite as much open to censure as the points I have mentioned, and I fear, have dwelt too long upon. In the interest of truth and the correctness of the history of Arctic exploration, to say nothing about a sense of common justice to myself, may I beg of you to publish this letter?

I am, sir, your obedient servant,

JOHN RAE, M. D., F. R. S.

4 Addison Gardens, Kensington,
22d June, 1891.

ANTONIO GARCIA CUBAS ON MEXICO.*

BY

GEO. C. HURLBUT.

This revised and augmented edition of the "Geographical, Statistical and Historical Picture of the Mexican United States" was prepared for the International Geographical Congress, which met in Paris in 1889. It is the result of conscientious labor on the part of the author, whose name guarantees its accuracy, and it brings together in a concise form data for which it would be vain to look elsewhere.

The work is divided into three parts. The first treats of the situation, boundaries and extent of the country, political divisions, revenues and expenditures, ethnographical divisions, climate, hydrography, physical aspect, etc. The second describes the population, roads, railroads, telegraphs, ports and lighthouses, public instruction, libraries, agriculture, mines, industries, etc.

The third part reviews the history of Mexico, the archæology, the immigration and ancient history, the conquest and the Spanish domination, and the seventy years of independence.

The republic lies between 14° 30′ and 32° 42′ N. Lat., and 86° 46′ 8″ and 117° 7′ 8″ W. Long. (Meridian of Greenwich); and it has an area of 1,946,292 sq. kilometres (751,495 sq. miles).

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* Etude Géographique, Statistique, Descriptive et Historique des Etats Unis Mexicains, par Antoine Garcia Cubas, Auteur de diverses œuvres scientifiques et litteraires, Chevalier de la Légion d'Honneur.—Ouvrage publié par ordre du Ministère des Travaux Publics. Mexico, 1889.

The confederation comprises 27 States, 2 Territories (Baja California and Tepic), and the Federal District,* with a total population of 11,395,712.† Half or nearly half of the total number is concentrated in the 12 middle States and the Federal District (5,481,959); next to these come the 7 States on the Pacific, with 3,693,488, then the 5 States on the Gulf, with 1,310,941, and last of all the 4 frontier States and the 2 Territories, with 909,324.

The urban population is nearly 2,100,000, or less than a fifth part of the whole. The largest city is the capital, Mexico, which has 350,000 inhabitants. Next in order are Guadalajara with 105,000, Puebla with 100,000, Guanajuato with 73,531, León and Mérida with 50,000 each. The other cities and towns have populations ranging between 6,000 and 45,000.

The Federal revenue, which amounted in 1880 to $21,936,156, increased in 1888 to $32,126,509; and the aggregate revenue of the States, which showed in 1880 a total of $7,011,962, attained in 1888 a total of $11,203,761.

The expenditures were: Federal, and State, in 1880, $27,257,481; in 1888, $42,747,518.

The value of real estate was, in 1888: City property, $252,086,126; other real estate, $221,433,745; making a total of $473,519,871.* On this subject Mr. Cubas remarks: "These figures are far from the truth, and have no importance beyond their application as a basis for the payment of taxes, according to the *minimum*, declared by the owners. The public buildings, civil and religious, are not included in these valuations."

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* The Federal District is composed of the Municipality of Mexico, and the Cantons, or Sub-Districts of Tacubaya, Tlálpan, Xochimilco and Guadalupe Hidalgo.

† The returns for the year 1880, give a total population of 9,908,011, but Mr. Cubas is inclined to think that this calculation falls below the truth.

Ethnographically, the population is divided into three groups; the European and Spanish American numbering 2,165,185, the Mestizoes numbering 4,900,156, and the Native Race 4,330,371 in number. The progressive element in the country and the one entirely in sympathy with European civilization is represented by the first group, and a large portion of the second, the two together constituting the larger part of the nation. This element supplies the professors of the liberal arts and sciences, the scholars, the engineers and architects, the writers and the printers, and the capitalists, and nearly all the artisans of the country. There are many well-organized workingmen's associations, possessing each its library, and supporting its own free school.

There is a sharp contrast between the individuals of the native race, who live in the neighborhood of the great centres, and those who inhabit the remoter and mountainous parts. The former are dull and indolent; the latter, who preserve their native tradition and their languages, are active cultivators of the soil.

The general characteristics of the indigenous race are mistrust, dissimulation, craftiness and obstinacy;

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* The actual value is about seven times as great. The *Statesman's Year Book*, for 1889, says: "The real property of Mexico, exclusive of mines, ports, rivers, and other public property, has been valued at 3,549,060,000 dollars in 1883."

qualities modified in many instances by civilization, but whether for the better or for the worse, Mr. Cubas does not say.

Some tribes, such as the Comanches and the Apaches, who make their incursions from the American territory, are pure savages. Besides agriculture, which is their principal occupation, the native Indians employ themselves in making cotton stuffs, basket-work, pottery, hats, and butter and cheese. Those who live in the remoter parts are always decently clad and cleanly in their persons. Converted to Christianity by the Conquest, these people have maintained in many places the practice of their ancient ceremonies, and on certain solemn occasions they perform their religious dances in the churches before the most venerated images, such, for instance, as that of the Virgin of Guadalupe.

The Indian, though inclined to excess in the use of strong drink, is brave, generally sober, and of great endurance. Many of the race live in sound health to a great old age. Those among them who have had the advantages of education have abundantly proved the adaptability of the race to a high civilization. The decrease and gradual disappearance of the race in certain parts of the country are due to various causes, such as epidemics, the wars through which the country has passed, and the mingling with the whites and the mestizoes. The Indian population is most numerous in the Southern States: Michoacan, Guerrero, Mexico, Hidalgo, Morelos, Puebla, Veracruz, Oaxaca, Chiapas, Tabasco, Campeche, and Yucatan.

The philologist Pimentel enumerates 14 ethnographic families, classified by their languages. The largest is the Mexican family, numbering 1,849,766 persons ; then follow the Othomí, with 794,734, the Mixteca-Zapoteca, with 677,088, the Maya-Quiché, with 456,283, and the Tarasca, with 275,000 representatives. No other family counts 100,000 individuals, and two, the Huave and the Guaicura, have each less than five thousand. The smallest family, the Séri, inhabits the Isla del Tiburon, in the Gulf of California. "Their number," says Mr. Cubas, "has very happily suffered a sensible reduction and now amounts to barely two hundred." A reference to the account given of this tribe by Orozco y Berra excuses the feeling of satisfaction with which Mr. Cubas looks to its approaching extinction : "The Séris are the smallest of the Sonoran tribes, but also the most cruel and the most deceitful, and the one least inclined to submit to an orderly life. . . . Lazy and indolent, they abandon themselves so completely to drunkenness that the mothers give the liquor from their own mouths to the smallest children." *

There are 96 cotton factories, large and small, in the Republic, consuming annually 57,200,000 pounds of cotton (28,600,000 of foreign growth), and producing 3,800,000 pieces of domestics, 280,000 pieces of calico, and 2,735,000 of cotton yarn. More than 50,000 families are supported by this branch of industry.

There are 16 woollen factories engaged in the production of cloths, carpets and yarn ; and seven paper-mills,

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* Los Séris . . . son la nacion mas pequeña de Sonora, mas tambien la mas cruel, la mas falaz, la que menos ha querido reducirse á vida politica . . . . . perezosos, indolentes, se entregan con tanta pasion á la embriaguez, que las madres dan con la boca el aguardiente á los niños mas pequeños.—*Geografía de las Lenguas y Carta Etnográfica de Mexico, pp. 353–354, Mexico, 1864.*

which supply the demands of the printing establishments.*

The organization of the Roman Catholic Church in Mexico embraces 326 prelates, with 8,763 churches and chapels and 11,337,000 parishioners.

There are 88 Protestant churches, distributed as follows: in the Federal District 21, Michoacan and Puebla, each, 13, Morelos 10, Mexico 5, Guanajuato 4, Hidalgo, Veracruz and Tamaulipas, each, 3, Querétaro, Jalisco, Tabasco and Zacatecas, each, 2, Guerrero, Tlaxcala, Aguascalientes, Nuevo Leon and Tepic, each, 1.

The railroad from Vera Cruz to the City of Mexico, formally opened on the 1st of January, 1873, after thirty years of efforts and delays and interruptions, had been in operation but four years when the great railroad movement began, which is still in progress. In 1880, there were 15 lines finished and at work; in 1888, there were 47 lines. In 1880, there were 1,055 kilometres (656 miles) of railroad in the country; in 1888, there were 7,506 kilometres (4,664 miles), of which 4,688 kilometres (2,913 miles) were broad-gauge and 2,818 kilometres (1,751 miles) narrow-gauge roads. There were, also, 351 kilometres (218 miles) of horse-railroad in the various cities and suburbs.†

The longest roads are: the Central (broad), from

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* According to information received at the Bureau of the American Republics, Washington, D. C., early in August, the first linen mill established in Mexico had been formally opened, not long before, on a site near the City of Mexico. The establishment is to cover a space of 42,000 square feet.

† According to the *Almanach de Gotha, 1891*, the collective length of railway lines was, on the 30th of June, 1890, 8,948 kilometres (5,560 miles), and that of the horse-railroads 416 kilometres (258 miles).

Mexico to Paso del Norte, 1,971 kilometres (1,225 miles); the Nacional Mexicano (narrow), from Mexico to Nuevo Laredo, 1,348 kilometres (838 miles); the Internacional Mexicano (broad), from Piedras Negras to El Torreon, 616 kilometres (383 miles); the Mexicano (broad), from Mexico to Vera Cruz, 424 kilometres (263 miles), and the Sonora (broad), from Guaymas to Nogales, 422 kilometres (262 miles).

It was in 1850 that Don Juan de la Granja sent the first message over a telegraphic line of 1,000 metres in length (0.62 mile), connecting the Palacio Nacional with the Minería. In 1880, the length of the telegraphic lines had increased to 16,910 kilometres (10,501 miles), and in 1888, to 44,395 kilometres (27,586 miles).*

In 1880 there passed through the Mexican Post Office 5,788,182 domestic, and 366,608 foreign letters and papers, yielding a revenue of $605,652. In 1888 the amount of the correspondence was: Domestic letters and papers, 27,390,288, and Foreign, 1,627,538; Revenue, $805,436.†

The ports open to foreign commerce are, on the Gulf of Mexico: Matamoros, Tampico,‡ Túxpam,

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* The *Almanach de Gotha, 1891*, makes the total length 47,505 kilometres (29,519 miles).

† The *Almanach de Gotha, 1891*, makes the figures for the year 1889: Domestic Letters and Postal Cards, 87,509,[illegible]0; Foreign, 37,193,403; Receipts, $976,571; Expenses, $1,039,818. Palpable as they are, the errors in this statement defy correction.

‡ The Bureau of the American Republics, Washington, D. C., reports, August 11, 1891, that the jetties of the new harbor at Tampico are advancing to completion. The north jetty has a length of 5,835 feet, the south jetty one of 5,340 feet, and it is expected that by October this year both will have been extended to 7,000 feet, with a depth of water of 34 feet at the heads.

Veracruz, Coatzacoalcos, Frontera, Isla del Carmen, Campeche, Progreso; on the Pacific: Guaymas, Altata, Mazatlan, San Blas, Manzanillo, Acapulco, Puerto Angel, Salina Cruz, Tonalá, Soconusco, La Paz, Santa Rosalia, Cabo San Lúcas, La Magdalena and Todos Santos.

Mr. Cubas gives a detailed classification of the imports and the exports for the first six months of the fiscal year 1885–1886. The value of the imports was $23,353,219, in which amount were included Cotton to the value of $7,361,493, Wool to the value of $1,728,172, Provisions to the value of $2,744,873, and Machinery $1,050,642. The imports from the United States amounted to $10,353,824, those from England to $5,219,638, from France, $3,903,758, from Germany, $2,168,970. Nearly half the total amount ($11,213,100) entered through the port of Veracruz. The duties paid on these $23,353,219 were $8,552,246.

The exports for the same period (six months of the fiscal year 1885–1886) were $20,229,785, of which amount $12,373,683 went to the United States, $5,588,172 to England, $1,293,147 to France and $702,437 to Germany.

The precious metals held the first place among the exports, with a total value of $14,734,722, subdivided as follows: Mexican silver coin, $11,198,201; Foreign silver coin, $27,819; silver bars, $2,349,628; mixed silver and gold, $61,131; sulphurets, $24,508; silver ore, $776,907; scrap-metal, $3,190; argentiferous lead, $2,680; Mexican gold coin, $137,485; foreign gold coin, $21,263; gold bars, $131,910.

After the precious metals came Henequen (Sisalhemp), $1,403,839; hides, $764,560; timber, $623,909; coffee, $553,635; vanilla, $282,812; Ixtle (fibre, like the henequen), $272,633; live stock, $265,768; lead, $240,790; tobacco, $192,269.

Of the total exports, $7,507,286 passed through Veracruz; $5,624,745 through Paso del Norte, $1,692,275 through Mazatlan, and $1,532,264 through Progreso.*

The arrivals and departures of vessels were in 1887: *Arrivals*, Foreign Ports, steamers, 653; sailing vessels, 587; Domestic Ports, steamers, 1,680; sailing vessels, 4,897; *Departures*, Foreign Ports, steamers, 642: sailing vessels, 562; Domestic Ports, steamers, 1,710; sailing vessels, 4,937.

The total tonnage was: Steam vessels entered, 1,558,232; sailing vessels entered, 319,043; steam vessels cleared, 1,573,161; sailing vessels cleared, 316,784.

Nearly all the Mexican States have adopted the principle of obligatory and gratuitous primary education, with penalties for the parents or guardians, who seek to avoid the obligation. The branches taught are: Reading, Writing, Spanish Grammar, Arithmetic (and the Decimal System), Geography, Compendium of Universal History, the History of Mexico, and Manners. To these is added, in the schools for girls, the use of the needle.

Nearly all the primary schools are maintained by the municipalities, but the Government supports, or makes appropriations for, a considerable number of them.

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* The imports and exports for the fiscal year 1888–1889 were, according to the *Almanach de Gotha, 1891*:

Imports, $38,658,333.

Exports: Merchandise, $21,373,148, Precious Metals, $38,785,275. } $60,158,423.

Besides the public schools, there are many originally private establishments, which are now under the supervision of various societies.

According to an Official Report, there were in 1881 8,536 Primary Public Schools (6,441 for boys, and 2,095 for girls) with 435,953 scholars (324,006 boys, 111,947 girls). In 1889, the figures were: 10,726 schools (8,027 for boys, 2,699 for girls) with a total of 543,977 scholars (393,142 boys, 150,835 girls).

In the Secondary schools instruction is given in: Arithmetic, Algebra, Geometry, Cosmography, General Geography, Universal History, the Geography and the History of Mexico, Book-keeping, Grammar, Foreign Languages, Drawing and Music.

The higher education, which is preparatory to the professional schools, embraces: Mathematics, Geography, Cosmography, Comparative Geography, Physics, Chemistry, Natural History, Logic, Ethics, Literature, Chronology and General History, the History of Philosophy, Stenography, Telegraphy, Latin, Greek, Spanish, French, English, German and Italian, Drawing and Music. In some establishments there are added the native languages, such as the Mexican and the Othomí.

These professional schools, all fully equipped with apparatus, collections and libraries, are: the Law Schools 19, the Schools of Medicine 9, Engineering (8 Colleges and 1 Mining College), Fine Arts 4, Agricultural 2, Commercial 2, Mechanics 7, the Conservatories of Music 3, the Schools for the Blind, and for the Deaf and Dumb, and the Military School (with 2 Naval Colleges).

In the Secondary schools for girls the branches taught are: Mathematics, Physics and the Elements of Chemistry, Spanish, Cosmography, Geography, History and Chronology, Comparative Geography, the History and Geography of Mexico, Writing, Bookkeeping, Domestic Economy, Domestic Medicine and Hygiene, Ornamental Drawing and Drawing from Nature, French, English and Italian, Needle Work, Pedagogy, Music, Singing, Horticulture, and the Elements of Natural History.

There are 16 of these Secondary schools for girls; and numerous Normal schools for the instruction of teachers.

The number of pupils in the Secondary and the Higher Preparatory schools is 21,000 (2,500 girls, 18,500 boys).

The expenditure for public instruction was, in 1888:

Appropriations by the Federal Government	$802,000
" in the Federal District..............	210,000
" by the States and the Municipalities.	2,500,000
	$3,512,000

The public libraries are: In the City of Mexico (omitting those of the special Colleges and Schools), the Nacional, 150,000 volumes, the library of the Cinco de Mayo, 9,000, that of the Museo Nacional, 3,000, that of the Sociedad Mexicana de Geografia y Estadística, 4,000 volumes; and 12 others (of which the largest has 25,000 volumes) in 12 cities, mostly of the Middle States.

The newspapers and periodicals published numbered, in 1888, 120 in the City of Mexico, and 267 in the rest of the country.

Mexico possesses three Meteorological and Astronomical Observatories ; one, the Central, in the Palacio Nacional at Mexico, one at Tacubaya, and, one at Mazatlan.

Mexico is a country of table-lands, rising from the coasts in a series of terraces to the great central plateau which attains its highest level, 8,465 feet, at Toluca. Two mountain ranges, the Sierra Madre Oriental on the east, and the Sierra Madre Occidental on the west, extend from Oaxaca, where they divide, in a north-westerly direction across the territory of the United States and British Columbia, and terminate in Alaska.

The plateaux, enclosed between these two ranges and many subsidiary chains, are nearly all at a great elevation above the sea. Mr. Cubas has brought together in the following list, to show the relief of the surface, a nnmber of elevations of plateaux and valleys :

	Metres.		Feet.
Plateau of Toluca	2,580	=	8,465
Valley of Ixtlahuaca (Mexico)	2,527	“	8,291
“ of Mexico	2,270	“	7,448
Plains of Apam (Tlaxcala)	2,480	“	8.137
Plain of Puebla	2,000 to 2,150 metres	=	6,562 to 7,054 feet
	Metres.		Feet.
San Juan de los Llanos (Puebla)	2,360	=	7,743
Valley of Maltrata (Veracruz)	1,691	“	5,548
“ Orizaba “	1,227	“	4,026
“ Oaxaca “	1,550	“	5,085
Cuernavaca (Morelos)	1,525	“	5,003
Plains of San Gabriel (Morelos)	1,008	“	3,307
Taxco de Alarcon (Guerrero)	1,780	“	5,840
Iguala “	919	“	3,015
Mescala (Rio de las Balsas)*	520	“	1,706

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* This river has its origin in the melting snows of Ixtaccihuatl. It is known in the upper part of its course as the Atoyac, and it reaches the Pacific after winding through several States for 500 miles.

For the last 200 miles its descent to the sea is by a succession of 226 rapids, so

	Metres		Feet.
Zitácuaro (Michoacan)	2,000	=	6,562
Chilpancingo (Guerrero)	1,420	"	4,659
Morelia (Michoacan)	1,950	"	6,398
Pátzcuaro "	2,190	"	7,185
Ario "	1,890	"	6,200
Jorullo "	850	"	2,789
Las Balsas (Rio de las Balsas)	123	"	404
Tula (Hidalgo)	2,047	"	6,716
Tulancingo (Hidalgo)	2,089	"	6,854
Llanos de Cazadero (Hidalgo)	2,300	"	7,546
San Juan del Rio (Querétaro)	1,950	"	6,398
Bajío (Guanajuato)	1,750 to 1,790 metres	=	5,742 to 5,873 feet
	Metres.		Feet.
Guadalajara (Jalisco)	1,523	"	4,997
Valley of Ameca "	1,180	"	3,871
Tepic "	900	"	2,953
Acaponeta "	64	"	210
Sayula "	1,386	"	4,544
Zapotlan "	1,495	"	4,905
Atenquique "	1,248	"	4,095
Colima (Colima)	532	"	1,745
Plains of El Salado (San Luis)	2,000 to 2,300 metres	=	6,562 to 7,546 feet
	Metres.		Feet.
Valle del Maíz "	1,220	"	4,003
Tula (Tamaulipas)	1,171	"	3,842
Ciudad Victoria (Tamaulipas)	449	"	1,473
Monterey (Nuevo Leon)	486	"	1,595
Cerralvo "	380	"	1,247
Cuencamé (Durango)	1,740	"	5,709
Vegas de Nazas "	1,100	"	3,609

The predominating rocks belong to the granitic, porphyritic, basaltic and calcareous groups.

The porphyritic rocks are colossal masses on the mountain tops, such as the Cofre de Perote, the Órganos de Actopan, the Pico de Bernal; or they are found in vast beds, and in this state they are rich in metalliferous veins.

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that, as one writer expresses himself, it is rather to be called a staircase than a river. The mean inclination of its bed, in this part of its course, is 3 feet 8 inches to the mile.

The basalts are met with in the form of lava, as on the sides of the Volcan de Ajusco and on the eastern slope of the Cofre de Perote ; or in compact masses and in regular columns. In this latter condition they enclose narrow valleys, such as those of Santa Maria de Regla and the Barranca Grande, in Hidalgo.

The granites and the syenites enter into the structure of some of the mountain chains.

Other chains are of calcareous formation, and this also predominates in the valleys.

What is known as the Volcanic Zone stretches across the country from East to West in a belt nearly 600 miles long and 60 miles in width. A line drawn from the volcano of Colima, in the neighborhood of the Pacific, to the volcano of San Andrés Tuxtla, near the Gulf of Mexico, passes through the middle of this zone. The principal volcanoes are : San Andrés de Tajimaroa, in Michoacan, the Nevado de Toluca, in the State of Mexico, Ajusco, the Sierra de San Nicolas and the Caldera, in the Federal District. Most of these are extinct. The active volcanoes are : Colima and San Andrés Tuxtla, Jorullo, Popocatepetl, and Orizaba.

The evidences of past volcanic action abound, moreover, throughout the territory of the Republic.

The measurements of 22 of the principal mountains are given by Mr. Cubas, as they stood on the record before Professor Heilprin's recent expedition. Considering the uncertainty as to the results of that expedition, it must be said that the mountains keep the relative rank assigned to them by Mr. Cubas. The names of the peaks are given, with the State or District to which they belong.

	Heights are above the sea.		
	Mètres.		Feet.
Popocatepetl (Mexico and Puebla)	5,425	=	17,798
Citlaltepetl, or Peak of Orizaba (Veracruz)	5,295	“	17,372
Ixtaccihuatl (Mexico and Puebla)	4,900	“	16,076
Xinantecatl, or Nevado de Toluca (Mexico)	4,578	“	15,019
Nauchampatepetl, or Cofre de Perote (Veracruz)	4,089	“	13,415
Matlalcueyatl, or Malintzi (Tlaxcala)	4,107	“	13,474
Ajusco (Federal District)	4,153	“	13,625
Zempoaltepetl (Oaxaca)	3,396	“	11,142
Pico de Quinceo (Michoacan)	3,324	“	10,906
Nevado de Colima (Jalisco)	4,378	“	14,363
Volcan de Colima (“)	3,884	“	12,743
Volcan de Ceboraco (“)	1,525	“	5,003
Pico de Tancítaro (Michoacan)	3,860	“	12,694
Monte Patamban (“)	3,750	“	12,304
Veta Grande (Zacatecas)	2,786	“	9,141
Jesus María (Chihuahua)	2,511	“	8,238
Monte Proaño (Zacatecas)	2,368	“	7,769
Las Navajas (Hidalgo)	3,212	“	10,538
El Gigante (Guanajuato)	3,250	“	10,663
Llanitos (“)	3,815	“	12,517
El Volcan de Jorullo (Michoacan),	1,300	“	4,265
El Volcan de Tuxtla (Veracruz)	1,500	“	4,921

Owing to the configuration of the country, with its high table-lands and mountain chains, the Mexican river systems are of no great importance. The principal basins are: that of the Rio Bravo (Rio Grande); that of the Mescala or Rio de las Balsas; that of the Panuco; that of the Lerma or Santiago; those of the Grijalva and the Usumacinta; and that of the Papaloapan. Of all these and the many smaller basins it may be said that they are practically useless for navigation. It is not to the rivers, but to the railways, and especially to the shorter and subsidiary lines, that the Mexicans must look for the means of developing the great resources of their territory.

The lakes may be divided into five groups. The first comprehends the lakes that have neither inlet nor outlet, and are supplied by the rain fall ; such as Lakes Xaltocan and San Cristóbal, in the Valley of Mexico, and, in Jalisco, Lake Magdalena, which had its origin in a destructive water-spout.

The second consists of the lakes formed by the expansion of rivers. An example is Lake Xochimilco in the Valley of Mexico. Into this descends from the mountainous region of Ajusco the Buenaventura River, which feeds the La Viga canal and through it communicates with Lake Texcoco.

The third is the group of lakes, which have no inlet and yet give rise to rivers. Zipimeo, in Michoacan, and Yuririapúndaro, in Guanajuato, belong to this class.

Lakes which receive and absorb the streams that flow into them belong to the fourth group. The Valley of Mexico has lakes of this character*: Texcoco, which receives two small rivers on the western, and several on the eastern side ; and Chalco, into which flow the Tlalmanalco and Tenango.

The fifth is the group of lagoons that communicate with the sea, like the Laguna de Términos, in Campeche.

The coast line of Mexico is very extensive, and measures on the Atlantic side 1,600 miles, of which more than 800 belong to the peninsula of Yucatan. On the Pacific the line is not far from 4,000 miles in length, the two coasts of Baja California alone measuring 1,880 miles.

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* San Cristóbal, which properly belongs to this class and is so entered by Mr. Cubas, appears also, by an oversight, in the first class.

It is not an easy matter to describe the climate and the productions of a region so extensive as the Mexican Republic.

Mr. Cubas says of the climate: "The northern portion of the Mexican territory lies within the temperate, the southern portion within the torrid zone. These two great divisions, combined with the varying elevations, determine the general distribution of temperature and the diversity of the climates. The most general division is the one that recognizes three regions: those of the hot land (tierra caliente), the temperate land (tierra templada), and the cold land (tierra fria). It is none the less difficult to mark the precise limits of each, since these vary with the elevation and pass by insensible degrees into one another, and the vegetation changes in the same way.

"The torrid zone and its tropical vegetation reach from the sea-level to the height of 1,000 metres (3,281 feet). The mean temperature, in summer, is from 30° to 31° Centigrade (86° to 88° Fahr.). The land in this zone and in the neighborhood of the sea is extremely fertile, thanks to the abundant humidity, which is maintained by constant dews and the copious summer rains; but the climate is not healthy. The north-east and south-west winds, which prevail on the Pacific Coast, and the violent north winds, which blow in tempests on the Gulf coasts from October to March, modify the temperature, and the mercury descends to 22° Centigrade (72° Fahr.). The parts of this zone which are not swept by the north wind, and which are situated in the vicinity of swampy lands, are unhealthy to the highest degree.

"A perpetual spring reigns on the slopes of the Cordilleras, between the altitudes of 1,000 metres (3,281 feet) and 1,600 metres (5,249 feet), the thermometrical changes never exceeding 4 or 5 degrees Centigrade (7° to 9° Fahr.) and the mean temperature varying from 23° to 25° Centigrade (73° to 77° Fahr).

"The two extremes of heat and cold are entirely unknown. Jalapa, Huatusco, in Veracruz, Chilpancingo and Tasco, in Guerrero, Ameca, in Jalisco, and many other places that might be named, are renowned for their perfect salubrity and soft climate Unfortunately, the clouds, driven before the winds and caught by the mountains, frequently cover all these places with thick fogs. The European may settle anywhere in this region and become acclimated, with perfect security against the endemic diseases that prevail in the torrid zone ; and the working man, whether artisan or farmer, has the prospect of acquiring a competence.

"The third zone includes all the country above the elevation of 1,600 metres (5,249 feet) and embraces a great part of the central plateau, the mean annual temperature of which varies between 15° and 17° Centigrade (59° and 63° Fahr.), with the exception of certain great depressions and deep, enclosed valleys, in which the temperature and the vegetation belong to the temperate zone.

"It is often remarked that a few hours' travel suffices to make a total change in the climate and the productions of the land. During the winter the mercury frequently sinks, on the lofty plateaux of Toluca and Mexico, below 0° Centigrade (32° Fahr.), and frosts are not uncommon ; but in general the winter is mild, and the mean temperature is from 13° to 14° Centigrade (55° to 57° Fahr.)."

The hot lands, on the Gulf Coast, are all Yucatan, the State of Tabasco, the greater part of Veracruz, and the portion of Tamaulipas near the sea. On the Pacific they include the whole of Baja California, and, with some exceptions, the coasts of Sonora, Sinaloa, Jalisco, Michoacan and Guerrero, and the State of Colima.

The cold lands may be said, in a rough way, to lie between the eastern and the western ranges of the Sierra Madre; and the temperate lands occupy the mountain slopes between the other two zones of climate.

There are but two seasons, the wet and the dry, in the torrid zone, and the changes are less sensibly felt than in the temperate or the cold regions. The wet season begins in June, the precipitation increasing up to the time of the autumnal equinox, and ceasing early in November. In this season the mornings are generally fine, but as the day advances the clouds gather and the rain descends, accompanied by thunder and lightning, frequently also by hail-storms and water-spouts; and then the atmosphere becomes limpid, and the sky pure and clear.

The climate and the soil of Mexico are adapted to the cultivation of every known plant, and it is not to be doubted that with the regular extension of the well-planned railway system the agricultural development of the country must take on steadily increasing proportions.

The annual value of certain products is stated as follows:

Cotton,	$10,857,000	Sugar,	$8,735,000
Rice,	1,246,000	Maize,	110,000,000
Indigo,	372,910	Beans and pease,	9,550,000
Cacao,	1,135,360	Aniseed,	105,000
Coffee,	3,200,000	Barley,	4,500,000
Tobacco,	2,500,000	Wheat,	18,400,000
Cochineal,	111,910	Sesame,	200,000
Vanilla,	900,000	Chile (pepper)	455,000
Sarsaparilla,	200,000	Potatoes,	600,000
Henequen, (aloe fibre)	3,718,750		
Ixtle, (aloe fibre)	700,000		$177,486,930

These figures are only approximate, for, as Mr. Cubas remarks, the Statistical Department of the Mexican Administration was still in its infancy in 1889.

For the encouragement of immigration a Colonization law has been passed, by authority of which the Government concedes certain advantages to settlers. A fixed proportion of land is sold to each settler at a low price and on a long credit, to be redeemed by yearly payments, beginning with the second year; the colonist is exempted from military service, and, for ten years, from the payment of any tax other than that of the commune; his tools, his furniture, his agricultural implements, building materials and cattle pay no tax whatever, and he has the privilege (which cannot be transferred) of exporting his products free of duty; and special premiums are awarded for the introduction of a new culture or a new industry.

Mr. Cubas enumerates 21 colonies, mostly of Europeans, established under these general conditions in various parts of the country. There are in all 7,000 colonists, the largest single settlement being that of 2,294 Mexicans from the United States, now permanently established at Ascension, in the State of Chihuahua.

The experience of other countries shows that immigration is by no means an unmixed benefit, and the Mexicans will have little cause for regret if many years pass away before the great human tide turns to their shores.

The mineral wealth of Mexico is not confined to gold and silver, but includes nearly every metal, the rarest as well as the most common, besides salt, sulphur, building stones, coal, marble, jasper, granite, porphyry, etc.

The metalliferous belt extends from the State of Sonora to the State of Oaxaca, a distance of 1,200 miles. The western chain of the Sierra Madre is richer than the eastern, but it may be said of both that their resources are practically without end. Silver and gold have been mined since the Conquest.

The history of coinage in Mexico begins with the establishment of the Mint by the royal order of May 11, 1535. The building was at first called the *Fundicion*, and hither were brought the gold and the silver, to be stamped and marked with the fineness of each piece and its intrinsic value. In 1562 the Mint was transferred to the Palacio, which the Government had acquired by purchase from the family of Cortés, and there remained until the year 1844, when it was removed to its present position adjoining the Museo Nacional. Under the Spanish domination the Casa de Moneda, in the City of Mexico, was the only mint in the colony, and its records present the sum total of the Mexican coinage for nearly 300 years. During the few years immediately succeeding the Conquest and before the Mint went into operation, gold and silver circulated in bars, stamped by the officers of the Crown. The coinage began in 1537, and the issues of the Mint, from that year to 1821, are divided into three classes, distinguished by the style of the coins. From 1537 to 1731, the pieces, known as *macuquinas*, were of irregular and unequal shape, struck by hand, and bearing on one side a cross, two castles and two lions, and on the other the cipher which indicated the name of the reigning monarch. From 1732 to 1771, the pieces were the Pillar dollars, circular in form, stamped with the arms of Spain between the Pillars of Hercules, and bearing the famous legend, *Plus Ultra.* From 1772 to 1821, the coins bore on one side the head of the king, and were known by the name of the Bust money. Within the last 40 years the Mint has been reorganized and refitted from time to time with improved machinery, imported from England, France and the United States. The total coinage during the Colonial Period was, in dollars :

	Gold.	Silver.	Total.
Macuquina.....1537–1731	8,497,950	752,067,456	760,565,406
Pillar..........1732–1771	19,889,014	441.629,211	461,518,225
Bust........ ..1772–1821	40,329,866	858,517,634	898,847,500
	68,716,830	2,052,214,301	2,120,931,131

Since the Independence, the Mint in the City of Mexico has coined : Gold, 15,694,251 ; silver, 237,703,199, and copper, 328,796 dollars, so that the product of the Mint, from its foundation in 1537 to 1888, was 2,374,328,581 dollars. Fourteen other mints (now reduced to eleven), established at various points between the years 1810 and 1868, have coined collectively 943,847,240 dollars ; and the total coinage of Mexico, from the beginning to the year 1888, amounts to 3,318,175,821 dollars. Mr. Cubas supplements his account of the mineral resources with an alphabetical list, including more than 1,000 names of mines, and mining properties, whether in operation, or temporarily in suspense.* Silver mines are the most numerous; next come, in order, gold, copper, lead, iron, cinnabar, coal, petroleum, etc.

An interesting chapter on the Valley of Mexico is followed by an admirable summary of Mexican history; and the work closes with a description of the reorganized army, and the infant navy of the country. The army is divided into the Active service, the Reserve, and the General Reserve; and the total force on a war footing amounts to 160,963, composed of 131,523 infantry, 3,650 artillery, and 25,790 cavalry.

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* The *Statesman's Year-Book,* for 1889, puts the number of mining enterprises at 324, employing 102,240 men.

THE COLORADO DESERT AND ITS RECENT FLOODING.

BY

B. A. CECIL-STEPHENS,

Secretary of the Historical Society of Southern California.

This article will give :

I. A BRIEF DESCRIPTION OF THE COLORADO DESERT.
II. AN ACCOUNT OF ITS RECENT FLOODING.
III. THE PROBABLE RESULTS.

I.

The Colorado desert lies between the 32° and 34° parallels of north latitude, and 38° and 40° longitude West from Washington.* Its larger portion is in the extreme south-eastern end of California, in San Diego County, and a smaller portion is in the north-eastern end of Lower California.

Its general shape is that of a triangle, with the apex to the north-west. The Sierra Madre, with an average altitude of 6,000 feet above the sea-level, forms its western side. Its eastern side is a spur of the Sierra Madre, which runs south-easterly about 180 miles to the Colorado River, at an average altitude of 4,000 feet. The desert valley opens south-easterly towards the Gulf of California. Its total area is nearly 6,000 square miles, of which 3,900 square miles is below sea-level, ranging from various depths to 360 feet, but averaging from 150 to 250 feet.

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* 115° and 117° W. from Greenwich, as on the map.

The surface, excepting this great depression, has a general slope towards the Gulf.

Fifteen miles west of the town of Yuma, at the junction of the Gila (pronounced *Hee'-lah)* and Colorado rivers, are the Cargo Muchacho buttes, which cover about 36 square miles.

In the Mexican portion of the desert are the Co-co'-pah mountains, which run only about 90 miles in a north-westerly and south-easterly direction, and have an average altitude of 2,000 feet. At the western base of these mountains is Lake Maquata (pronounced, *Mah-quah'-tah*), which is about 40 miles long, and 8 miles wide. Its waters are very salty.

The soil of the desert is composed mostly of sand and gravel, covered in many places with vast deposits of different salts, and in some localities with large bodies of common salt.

Scattered here and there are many beds of hot, wet mud, which heave and fall with escaping sulphurous gases, and which are popularly called "volcanoes." Near the Cocopah mountains is an extensive region of these volcanoes of greater or lesser size, with accompanying mineral springs.

The only streams which run in to the desert, except New River, are the White Water, San Felipe and Carriso, on the west side. The two last-named have water only for a short time during the rainy season. What little water they ever do carry is rapidly absorbed by the desert sands.

Owing to the extreme lack of moisture and the excessive heat during a greater part of the year, only the hardiest members of the vegetable kingdom are able to grow, and that in the most favorable localities. The principal tree is the mesquite (pronounced, *mess-keet'*, the *Prosopis Juliflora*). The Indians subsist chiefly on its beans. There are many varieties of cactus, including the saguaro (*C. Giganteus*). Grasses flourish only for a brief period on the overflowed lands after the floods. In some localities the forests of mesquite are quite extensive, and in many places along the northern edge of the desert are groves of the fan palm (*W. Filifera*), which bears a very sweet fruit.

The Indians, who inhabit this region, number about 400, and belong to the Cahuilla (pronounced, *Kah-weel'-yah*) tribe; they are a long-lived race.

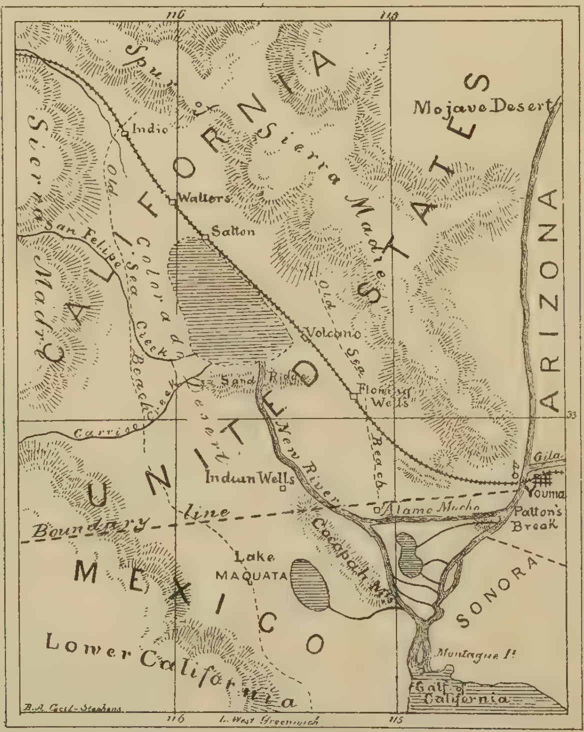
The fauna is restricted to the coyote (*Canis Latrans*), the scavenger of the ground, and the vulture (*Cathartes Aura*), the scavenger of the air; and in the limited mesquite forests are many varieties of birds of bright-hued plumage or sweet voices; besides rabbits, reptiles, etc.

The average annual precipitation is about two inches, evaporated almost as quickly as it falls. The heat from February till November ranges from 110° to 130° F.

A vast, verdureless and waterless plain, with high and barren mountains on either hand, a burning sun fiercely glaring upon hot, white sands occasionally stirred by an atmosphere like a furnace-blast, briefly paints a picture of the Colorado desert.

The first white man to cross the Colorado desert was Captain Juan Bautista de Anza, who, under royal orders from Spain, in the year 1774, went from Yuma to San Felipe pass, in exploring an overland route from Sonora to California. The San Gorgonio pass, through which White Water River flows, was subsequently more travelled. This was the way of the Argonauts of 1849–50, of whom some 60,000 came by the southern route, many of whom were lured to death by the mirage, common to all deserts.

In 1877, the Southern Pacific Railroad was built from San Gorgonio pass, skirting the eastern edge of the desert, to Yuma. Its surveyors determined the different points of the road below sea-level as follow, in feet: Indio, 20; Walters, 195; Salton, 263; Volcano, 225; Flowing Wells, 5; a distance of 59 miles.



Mr. Cecil-Stephens assumes all responsibility for his map.

This great depression has always excited more curiosity and interest than any of the many other wonders of the desert. It is about 130 miles long with an average width of 30 miles. Its entire rim is sharply defined by water-worn rocks and old sea-shells; in fact, it is the beach of an ancient sea. When and how was this old lake dried up? A slight examination of the geography next to the Gulf easily answers these questions.

Touching the desert on its eastern side, and from 100 to 400 feet above it, is the Colorado River on its 1,400-mile course from the Rocky Mountains to the Gulf of California. Its waters are colored red by the immense amount of sediment which they carry; hence the name. All the land between Yuma and the Gulf, a distance of 160 miles, has been made by the river, whose banks are higher than the country on either side.

There is an old Spanish map, which marks the Gila River as emptying directly into the Gulf; and, while this was once undoubtedly true, it was long prior to the time of that map-maker. The Gulf then extended some 200 miles north of its present limits to the neighborhood of Indio. The river floods, assisted by the Gulf tides, formed the bar which divides the Gulf from the old desert sea-bed. This bar is only about 15 miles wide, and surveys show that a channel could be easily cut through it.

As the waters of the desert sea evaporated, they became heavier from their salty parts, and gradually retreated towards the lowest portion of the bed, where the greater quantity of their salt was deposited. This accounts for the large mine at Salton, which is worked for commercial purposes.

In 1859, Dr. O. M. Wozencraft obtained a conditional cession from Congress to run an irrigating canal from the river near Yuma westerly on the desert for reclaiming some 1,600 square miles of arable land. Surveys demonstrated the practicability of the scheme, but the Doctor's death stopped the work.

II.

The Colorado River seems to have repented of its evil work, and is now seeking to atone for its great sin, in desolating so large a portion of the earth, by refilling the desert sea.

From 15 to 40 miles above the Gulf there are many breaks in the west bank of the river, from 20 to 50 feet above sea-level, through which the water flows in the flood seasons. The channels from these breaks unite in one, called New River, which runs back down into the desert over 100 miles to the Indian Wells region, 38 feet below sea-level. One branch of New River feeds Lake Maquata.

Twice a year, in February and June, the Colorado River is full; first from the heavy winter rains in the Rocky Mountains and again from the melting snows in summer. Since 1871, twenty years, New River has extended its channel northward fully twenty miles. In this work it has been assisted by the great tidal wave or *bore* of the Gulf, which has been marked at Montague Island, at the mouth of the river, as high as 32 feet. This *bore* comes in with the spring tides, and rushes far up the Colorado and New River. It is very dangerous to navigation, but it announces its approach with a roar that is heard for miles.

Hitherto, the floods of New River have not reached as far north as Salton because of a sand ridge formed by the winds across it, about ten miles long, a half a mile wide and nine feet high.

The winter of 1890–91 was one of the wettest ever recorded on the Pacific coast. Heavy rains fell for a long time, and all the streams were running bank-full and overflowing for a greater period than usual. The Colorado River reached the highest point ever known, since observations were first taken in 1850, being marked at Yuma at 33 feet and 6 inches, in February, 1891. This last high water caused New River to boom as never before, but the results were not apparent till the following June.

On the 23d of that month the people at Salton first noticed small streams of water trickling down into the marsh. Day by day the water has increased in volume until now a lake forty miles long and ten miles wide, with an average depth of four feet, is visible to the west and south. The daily average rise has been and continues at the rate of about one inch.

The discovery created a sensation which the press speedily published far and wide.

About two weeks later, two prospectors returned to San Diego City, and reported that the Indian Wells region, containing about 3,200 square miles, was flooded by New River. Later, a Mexican rode up from Lower California on horseback, along the eastern side of the Sierra Madre, till he found a place shallow enough to ford, when he crossed to the railroad, and confirmed the report of the flooding of the Indian Wells country.

The water continuing to rise at Salton, and no satisfactory account of its cause being known, Mr. H. W. Patton, of the Banning *Herald*, being outfitted by the San Francisco *Examiner*, left Yuma on July 9th in a small boat, accompanied by guides, and sailed down the Colorado River about forty miles, where, at a point about 340 feet above the lowest part of the desert, he found a break in the west bank about a mile wide through which the water is flowing down into the desert.

Here, a bar is forming, which it seems will eventually turn the whole volume of the river into the desert. Turning into the main channel, which is about 200 yards wide and 18 feet deep, with a current of 4 miles per hour, they floated along over the old overland stage route. Marks on the trees showed that the water had been 4 feet higher.

At Alamo Mocho, an old station 52 miles southwest from Yuma, there was water all over the country as far as they could see. Ten miles west of Alamo Mocho they met the New River stream, coming from the south, 100 feet wide and 12 feet deep. Here the two streams united, and turned to the north, 300 yards wide and 14 feet deep with a current of 6 miles per hour. At places the stream spreads out into large lakes.

On the 12th they passed through a large break in the sand ridge, which hitherto prevented the New River floods from entering the Salton basin. This break was 200 yards wide and 7 feet deep, and the current was very swift. After going through this break they saw 10 large streams join their channel on the west, showing that there are other breaks in that direction. Sailing through a chain of lakes on the 14th, they saw a large stream flowing in from Carriso Creek, and that evening they safely landed at Salton, having made a voyage of over 200 miles, and demonstrated the source of the flood.

Last May the annual summer rise of the Colorado began. July 19th, the river marked 21 feet and 8 inches at Yuma. Low water mark is 12 feet, although it has not been below 14 feet and 6 inches for 13 years. This summer rise, aided by a bore in June, caused the waters of the Indian Wells basin, already filled by the February flood, to break through into the Salton basin, 225 feet lower. The desert area flooded to date is not less than 3,500 square miles.

III.

Will the flood be permanent? It seems that this question can be answered in the affirmative. The channel at the Patton break has been cut so deep that the water will continue to flow through to the desert at the lowest stages of the river. Hitherto, New River has always flowed when the Colorado marked 19 feet at Yuma. For months past the Colorado has poured down past Yuma 100,000 cubic feet per second to probably ten times that amount, the bulk of which has found its way to the Gulf, but a large portion has gone to the desert. According to the figures of conservative engineers, the inflow into the Salton basin the past 60 days has been not less than 8,548 cubic feet per second, exclusive of the evaporation and infiltration, which is very great for the distance of 200 miles.

If the sea becomes permanent, it may be a matter of only a short time till the Gulf is again connected with its old bed through New River. At all events the California peninsula will simply be extended northward about two degrees of latitude, and with it would naturally come the finer climate of the peninsula. Southern California would then have summer rains, and its annual precipitation and irrigating supply would be increased.

The prevailing winds of Arizona are from the north and west over waterless wastes. The Colorado sea permanent, and the heights of the Mogollon and the Sierra Blanca would wring out of the moisture-laden winds a sufficient amount of rain to greatly increase the irrigating supply of that region. Perhaps it was when the Colorado River built its banks south to the Gulf, and dried up the desert sea, the Arizona mountain streams so decreased that the builders of the Casa Grande found it no longer profitable to war with nature and Apaches, and moved to the more favored vale of Anahuac.

Los Angeles, August 6, 1891.

Editor's Note.—It is of interest to reprint from the New York *Times* the remarks made by Maj. J. W. Powell, Director of the U. S. Geological Survey, to a reporter of that paper, in July:

> The cause of the inundation, namely, the overflowing of the Colorado River through a newly-made mouth, had been correctly stated in the *Times*, he said, some time ago, and while this had cleared away all the sensational stories of a subterranean channel and stripped the phenomenon of all its mysterious elements, still there were many facts which were of interest in connection with the occurrence, because what had happened in this case might happen at the mouth of any river which had a delta.
>
> "The traditions of the Indians are by no means the only evidence that this basin has been filled, wholly or partially, before," he said. "Since the delta was formed and that portion of the Gulf of California was cut off and left to evaporate under the terrific heat of the sun, the Colorado has been playing pranks of this sort on several occasions. Along the hills which form the sides of this basin there are shore-marks

which indicate that at different times the basin has been flooded to different heights, and then, when the river cut back through its old channel, evaporation has again changed the lake to a parched desert. Along these shore-lines shells have been found which confirm this theory. The action of the Colorado in cutting new mouths for itself and then stopping them up is comparatively rapid, because of the quantity of silt which the stream carries. It is not unlikely that the supposed traditions of the Indians are facts within the memory of some of the older ones of the scattering bands that live on the hillsides along the basin, for indications are that the valley has been inundated within fifty years, and certainly it has at least once or twice since this continent was discovered.

"There is no immediate danger of the basin being filled, because it requires a large volume of water to fill it to the river level, and the evaporation is something wonderful. At the present time, according to reports, only a fraction of the water in the Colorado is flowing from this new outlet. It is possible that the channel may be enlarged as the stream flows through it so that all the water in the river will pour into the basin. Even if that were to happen the evaporation is great enough to take up fully one-half of the Colorado as it spreads over the basin, and it would probably require from two to three years for the balance to fill the hole up to level. At times, when essentially the same thing has happened, a flood in the main body of the river has washed away the deposits at the mouth and the river has emptied itself from its natural mouth again, leaving the basin half filled. At such times as the river filled the basin to its level the flow to the Gulf of California has been through a channel which begins at the lower end of the basin and makes a short cut directly south to the salt water. This is called Hardy's Colorado, and it is usually simply a dry channel or ditch. It may have been formed under circumstances similar to those existing at present. It is large enough to accommodate the entire volume of the Colorado after the evaporation which is sure to take place while the water is spread over the basin.

"Some idea of the terrible heat may be had from the evaporation which takes place. If the basin were filled to the river level, the lake would present a surface of about 1,600 square miles. This would be lowered at the rate of six feet a year by evaporation. The salt which is now being mined at Salton was deposited by the previous evaporations. The original salt deposit from the water which was a part of the Gulf of California is not responsible for all that is found there. The waters of the Colorado are saline, for the river flows through beds of rock salt at places many miles up from its mouth, and the successive deposits from the waters of this river as they have flooded the valley and then dried up have added largely to the original deposit."

THE PRETENDED DISCOVERY OF THE SOURCE OF THE MISSISSIPPI RIVER.

BY

CAPT. WILLARD GLAZIER.*

Editor's Note.—This paper was read before the Congrès at Berne, on the 12th of August, 1891, by Mr. Francis A. Stout, Vice-President of the American Geographical Society, and was referred to a Committee, composed of Sir George Bowen, Maj. Post, U. S. A., Messrs. Napoléon Ney, A. de Claparède and E. v. Hesse-Wartegg. The Committee reported, August 13, that Captain Glazier's claim was without foundation, and that the sources of the Mississippi were discovered by Schoolcraft, Lieutenant Allen and Nicollet.

It is proposed to state Capt. Willard Glazier's claim to the discovery of the true source of the Mississippi River; to recall with brevity the historical facts as to the real discovery; to show the character of Captain Glazier's pretended exploration; and to ask of the Congrès International des Sciences Géographiques such an expression of opinion as may establish the truth.

Captain Glazier's claim was first made known by the following letter (published, with the map to which it refers, in the *Proceedings* of the Royal Geographical Society of London, Vol. VII. (1885), pp. 23–25):

"The true source of the Mississippi has been a vexed question among American geographers for some time, the country around its head waters being in a very wild condition, inhabited only by Indians, and access to it difficult of accomplishment. In June, 1881, I organized and led an expedition with the object of settling forever the question of the source of our great river.

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*The name Willard Glazier is not to be found in the U. S. Army Register, nor in the List of Officers of Volunteers, 1861–1865, in the records of the War Department, nor in the U. S. Navy Register.

"We proceeded in canoes viâ Leech Lake to Lake Itasca, and accompanied by an old Indian guide, pushed forward to the south, and were rewarded by the discovery of another lake of considerable size, which proves to be, without the shadow of a doubt, the true source of the Mississippi, in lat. 47° 13′ 25″. From notes taken during the ascent, it cannot be less than three feet above Lake Itasca—the hitherto supposed source of the river.

"The Mississippi may, therefore, be said to originate in an altitude 1,578 feet above the Atlantic Ocean. Its length, taking former data as the basis, may be placed at 3,184 miles. The origin of the river in the remote and unfrequented region of country between Leech Lake and Red River, not less than an entire degree of latitude south of Turtle Lake, which was for many years regarded as the source, throws both forks of the stream out of the usual route of the fur trade, and furnishes, perhaps, the best reason why its head has remained so long in enveloped in obscurity.

"I take the liberty of enclosing herewith a map showing my route and the true source of the Mississippi.

"MILWAUKEE, WISCONSIN, June 17th, 1884.

"*To the Secretary, Royal Geographical Society.*"

The letter as printed in the *Proceedings*, is without signature, but has the heading:

"*Discovery of the True Source of the Mississippi.*
By Captain WILLARD GLAZIER (U.S.)."

It does not appear that Captain Glazier's letter was introduced, or supported by the authority of any person known to the Royal Geographical Society. He threw himself, unknown as he was, upon the generosity of the Society, and was received with large hospitality.

The historical facts with regard to the real discovery of the source of the Mississippi were admirably stated by Mr. Russell Hinman of Cincinnati, Ohio, in a communication to the New York journal, *Science*, Vol. 8 (1886), pp. 142–145; and more at length by Mr. Henry D. Harrower of New York, in a pamphlet, published in October, 1886. The record is as follows:

The earliest exploration beyond Cass Lake (which lies N. E. of Lake Itasca) was made by Henry R. Schoolcraft in 1832, under authority of the War Department. Schoolcraft made an official report on the 1st of September, 1832, and published in 1834 the narrative of his expedition, with a map, compiled by Lieutenant Allen. On this map Lake Itasca is laid down as the source of the Mississippi, and on p. 58 of the *Narrative* is the passage: " The outlet of Itasca Lake is perhaps ten to twelve feet broad, with an apparent depth of twelve to eighteen inches. The discharge of water appears to be copious, compared to its inlet." This inlet, leading from a smaller lake to the south of Itasca, is indicated on the map.

Four years after Schoolcraft, (in 1836) Mr. J. N. Nicollet* made an instrumental exploration of this region. His report and map were published by the

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* Mr. Nicollet was a native of Chambéry, Savoy. He was a trained scientist, who had worked with Laplace and had filled the chair of mathematics in the Collége Louis-le-Grand.

U. S. Bureau of Topographical Engineers as "Senate document No. 237, 26th Congress, 2d Session, 1843." In this report he says (pp. 57–59): "There are five creeks that fall into it (Lake Itasca), formed by innumerable streamlets oozing from the clay beds at the bases of the hills . . . known here by the name of 'heights of land.' . . . These are the waters which I consider to be the utmost sources of the Mississippi. Now, of the five creeks that empty into Itasca Lake, one empties into the east bay of the lake, the four others into the west bay. *I visited the whole of them;* and, among the latter there is one remarkable above the others, inasmuch as its course is longer, and its waters more abundant; so that, in obedience to the geographical rule 'that the sources of a river are those which are most distant from its mouth,' this creek is truly the infant Mississippi. The day on which I explored this principal creek (August 29, 1836) I judged that, at its entrance into Itasca Lake, its bed was from 15 to 20 feet wide and the depth of water from 2 to 3 feet. . . . After having devoted three days to an exploration of the sources of the Mississippi, and spent portions of the nights in making astronomical observations, I took leave of Itasca Lake. . . . The honor of having first explored the sources of the Mississippi, and of introducing a knowledge of them into physical geography, belongs to Mr. Schoolcraft and Lieutenant Allen. I come only after these gentlemen; but I may be permitted to claim some merit for having completed what was wanting for a full geographical account of these sources. Moreover, I am, I believe, the first traveller who has carried with him astronomical instruments, and put them to profitable account along the whole course of the Mississippi from its mouth to its sources." On pp. 124-125 of his Report Nicollet gives his determinations of the geodetic position and the elevation of the region. He places Schoolcraft's Island, in Lake Itasca, in N. Lat. 47° 13′ 35″ and W. Long. (from Greenwich) 95° 2′. The elevation of the island is 1,575 feet above the level of the Gulf of Mexico; and, in Nicollet's own words, "the utmost sources of the Mississippi, at the summit of the height of land six miles south of Lake Itasca," have an elevation of 1,680 feet above the Gulf.

Nicollet finished the work he undertook to do. He explored and described and mapped the sources of the Mississippi, from the rills that trickled down the Height of Land to collect in Lake Itasca to the lake itself, and the River Mississippi that flowed from it. Every later exploration by competent men has confirmed the authority of his survey. He bestowed no name; but in 1879 the engineers, who subdivided the district into one-mile sections under the orders of the U. S. Land Office, gave to one of the lakelets formed by the widening of the creek, which Nicollet described as the longest of the four on the west, the locally-known name of Elk Lake. The U. S. Land Office Map of Minnesota, issued in 1879, shows Elk Lake a little to the south of Lake Itasca.

These are the facts concerning the discovery of the sources of the Mississippi.

Captain Glazier states in his letter to the Royal Geographical Society that he made his expedition in June, 1881, but he does not add that he took with him a copy of the Land Office Map. In the detailed account of his trip, published in 1884, the *American Meteorological Journal* (Vol. I.), of Detroit, Mich., he unwarily fixed the position of Lake Glazier (Elk Lake) in N. Lat. 47° 13′ 25″, its height above sea level at 1,578 feet, and its distance from the sea at 3,184 miles.

Mr. Russell Hinman showed, in his communication to *Science* (in 1886), that Captain Glazier's latitude of Lake Glazier is only 10 seconds less than the latitude of Schoolcraft's Island, in Lake Itasca, as determined by Nicollet; that this difference of 10 seconds is equal to 1,013 feet, 3 inches, the degree of latitude between 46° 30′ and 47° 30′ N., measuring, according to the U. S. Coast Survey Report, 1884, 69.079 miles; and that the pretended latitude of Lake Glazier places it actually *within* Lake Itasca.

Mr. Hinman showed also that the "Meteorological Observations at the head waters of the Mississippi," from July 17 to August 2, published by Captain Glazier as his own (*Am. Meteorological Journal*, Vol. I., p. 328), were copied, word for word and figure for figure, from a table of observations made by Schoolcraft in 1820 (see Schoolcraft's *Narrative*, ed. 1855, p. 423).

These exposures of his method put Captain Glazier upon his guard. He has never since made a precise statement; and his thick volume, entitled *Down the Great River*, published at Philadelphia in 1887, while it professes to give an account of the "Discovery," is wholly taken up with trivial adventures and descriptions.

In one word, Captain Glazier discovered nothing; but by persistent self-assertion and the help of serviceable publishers, he succeeded in imposing his Lake

Glazier upon the people to such an extent that it became necessary for the Legislature of the State of Minnesota to pass the following Act:

CHAPTER 69.

H. F. NO. 702.—AN ACT TO FIX THE NAME OF A LAKE FORMERLY KNOWN AS ELK LAKE.

Be it Enacted by the Legislature of the State of Minnesota:

SECTION 1. That the lake known for many years to the Indians and early explorers as Elk Lake, situated in Beltrami county, in section twenty-two (22) of town one hundred forty-three (143) north, range thirty-six (36) west, fifth principal meridian, shall be known and designated hereafter on all official maps of the State and named in all county and State records referring to the same, as "Elk Lake."

SEC. 2. No edition of any school geography, published subsequent to January one, eighteen hundred and ninety, which contains any map giving any name to the lake specified in section one other than "Elk Lake," shall be used in the schools of this State.

SEC. 3. This act shall take effect and be in force from and after its passage.

Approved April 24, 1889.

In the same year the Minnesota Historical Society, of St. Paul, commissioned Mr. J. V. Brower, with a party of engineers and assistants, to make a minute topographical and hydrographical survey of the Itascan basin. The work has been accomplished, but the report has not yet appeared in print.

It is under a sense of duty to all honorable workers in the field of science that the American Geographical

Society submits to the Congrès International the foregoing history of a pretended exploration by a man, of whom it must be affirmed, on the evidence of his own writings, that he never saw the head waters of the Mississippi.

GEO. C. HURLBUT,
Librarian.

NEW YORK, March 15, 1891.

REPORT ON EXPLORATIONS IN NORTHERN MEXICO.

BY

CARL LUMHOLTZ.

After having visited the Zuñi, Moqui and Navajo Indians of Arizona I last summer proceeded to the City of Mexico in order to make the necessary arrangements with the Mexican Government, with regard to my intended explorations of the Sierra Madre. The way had been prepared for me in Mexico by the kind offices of the Secretary of State, Mr. Blaine. President Diaz and all the members of his Cabinet afforded me every imaginable facility and support. Orders were given to pass my baggage and supplies free of duty and to furnish a military escort whenever needed, and I was further provided with letters of recommendation to prominent persons in Northern Mexico. I then returned to the United States to organize the expedition. Tremendous floods in the southern part of New Mexico and Arizona retarded my work for about a fortnight, but at last in the beginning of September, 1890, I was able to make a start from Bisbee, Arizona, for Sonora, Mexico, travelling in a southerly direction.

The main object of my expedition, which I have the honor to conduct under the auspices of the American Geographical Society and the American Museum of

Natural History, is to make researches into the ethnology and archæology of Northern Mexico. The Sierra Madre, the broad mountain chain that stretches from the United States through a great part of Mexico, has in its northern part never been scientifically explored.

This region, the continuation of the Rocky Mountains, offers a wide field for scientific exploration, now that the reduction of the fierce Apaches to submission by General Crook, in 1883, has opened the country to peaceable men, the present expedition being the first to take advantage of this change. Small bands of Apaches are still left there, and others are constantly breaking away from the San Carlos Reservation. The Mexican knowledge of these mountains may be thus briefly summed up: that it is a tremendous mountain country and difficult of approach. It would sometimes take eight days to reach the top of one ridge. There are, besides, great pine forests alive with deer and bears, wonderfully large woodpeckers that are able to cut down whole trees, plenty of remains of long ago vanished people who lived in towns and tilled the soil, and built monuments and even bridges over some of the cañons.

A story is told by an American, who had lived among the Apaches for a number of years, of a beautiful and fertile valley, which showed traces of a former dense population in the ruins which remained, and the great number of planted fruit trees still bearing fruit. There were once worked in this wild part of the Sierra two famous mines, the location of which is now lost. They are said to have been the property of the Jesuits, who, before their expulsion from Mexico, held nearly all the mines in the country. The tradition says that the Apaches killed every soul in the two mines of Vainopa and Tayopa, and so they were forgotten until recent times, when people studying the old church books and other early Spanish documents discovered the record of their existence. Several expeditions have been sent out, one, I believe, by the Government, but in vain. Being situated in a very rough country, these mines are still awaiting their re-discoverer, and the Governor of Chihuahua, who told me much about them, felt very sanguine that I was to be the lucky one to find them, encouraging me by saying that if I found Tayopa it would be worth fifty million dollars. More than the prospect of riches, to which I am not indifferent, my zeal for science is stimulated by the hope of meeting in the Sierra Madre with people who are living to-day as they were before the coming of the Spaniards.

I have reason to believe that in the rugged fastnesses of these almost unknown regions there may dwell tribes who are in the most primitive state of culture, even to the extent of dwelling in cliffs and caves. The old church books of Bacadehuachy tell us, says Mr. F. A. Bandelier, of the Jesuits going out in the mountains to administer the sacrament to the Tarahumari Indian who were living in caves and cliffs. But I am convinced that many of this same tribe are still living in that way ; there may be others. What light might one not hope to throw on the early development of the American race by a close study of the culture, manners and mode of life of such primitive people !

I had with me a party of scientists and assistants, representing archæology, botany, zoology, mineralogy and geology.* Prof. W. Libbey, Jr., of Princeton, N. J., took part as the physical geographer of the expedition, bringing with him his laboratory man. We were fully provided with a photographic camera, two kodaks, one detective camera, assaying outfit, anthropometric, meteorological and geodetic instruments, etc.

As we left the dreary plains of Arizona behind us we entered upon a more pleasing country, where the hills sloped to the sparkling streams, that ran between banks lined with the wild grape vines, the cotton-wood and other trees, and the landscape was fresh and green after the heavy rains.

Among flowers is noticeable on the river banks the exquisite, gorgeous, white *Datura Metalloides.* Its crown is six inches long and four inches broad. We saw one cluster of this creeping plant fifty feet in circumference. It is well known on account of the disfavor with which it is regarded by the better class of the Navajos, the root being employed as an aphrodisiac, and its use often resulting in madness or death. The effect of the poison is cumulative, and the Indians under its influence are like Malays running amuck and trying to kill all they meet.

A plant of the cucurbitaceæ was the *Lagenaria,* with its carrot-like root, six feet in length, used here as soap. Among birds the most numerous were flycatchers and doves.

The first pueblo passed was Fronteras, once the scene of many desperate encounters with the Apaches.

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* Messrs. R. Abbott, G. Haviland, A. M. Stephens, C. V. Hartman, F. Lloyd, F. Robinette and H. White.

Here I dug out eight valuable Apache skulls from a well, into which a number of men and women had been treacherously thrown by the Mexicans.

Passing Cochuta to the south, we met with an extensive stratum of fossils, but had no time to make any excavations. Several gigantic animals have been washed out here by floods and carried off. Many signs of former habitation appear in the neighborhood in the form of ruined pueblos. In one of these we saw stones arranged in a parallelogram measuring fifty feet long and half as many wide. No built wall was underlying these surface stones ; and sometimes they are set in a circle. A lot of broken pottery and arrowheads we gathered in the ruins, with which the whole country abounds. Gold and coal were found in this district in considerable quantity, but yet not enough to make them an object for mining.

Some forty miles south of Cochuta I turned in a southeasterly direction and climbed a hilly plateau, 3,200 feet above sea level. The geological formation was still volcanic and metamorphic rock. Here we found the first orchids, yellow in color and deliciously fragrant, and in the cañons below we saw the first palms. We then descended to the Bavispe River, a name here given to the upper part of the Yaqui. It is worthy of remark that the Mexicans designate the same river by different names in different parts of its course.

We followed the river to the south, passing Ópata, Guasabas and Granados.

The country was fertile but dry, and the heat was great. Even at the end of October the thermometer marked nearly 100° Fahr. in the shade. There were fields of sugar cane, and in the orchards grew orange trees, figs and lime trees in abundance. Grass had become dry and scarce, and it was difficult to keep our animals in condition.

The Mexicans of Eastern Sonora are here not easily to be distinguished from the Ópata Indians. In the different pueblos on the Bavispe our large party, with the animals and baggage, created quite a sensation among these people and roused them from the routine of their uneventful daily life. Every day they came to consult me for their ailments, and it was of no use to tell them that I was not a medical man and that I could not give them remedies. They would have me feel their pulse, and tell them what was the matter with them, how long they were going to live, etc. A great many of them were suffering from indigestion. There were a number of deaf and dumb persons among them, the result of their constant intermarriage; there were cases of epilepsy, also, and some of insanity.

A curious case of a man coming very near to being killed by the maggots of the blue screw-fly came to my notice. He was a soldier, who once in a fight had got his nose cut off, his nostrils thereby becoming entirely exposed. One night when he was drunk the screw-fly laid its eggs in his nose, and when these were hatched it seemed as if he was to be eaten up alive. I gave the man some relief by syringing the place with a solution of corrosive sublimate, but an intelligent Mexican, who had an extensive knowledge of native medicinal plants, with which the country abounds, many of them no doubt very valuable, treated the patient and in two days he seemed to be in a fair way of saving the poor wretch.

Several of my mules and donkeys were attacked in the same way by maggots in sore places, and it was exceedingly difficult to free the poor animals of this disgusting plague.

I was assured that there never had been a thief known in this place. However that may be, one thing is certain, that the Mexicans of Eastern Sonora are a nice class of people. They are pleasant to deal with, very active and obedient, and I never wish for better men than I have at present in my camp, nearly all of them being from these parts. The influential men, one or two in each town, are very obliging, and they tried to help me in many ways. People are ignorant, for instance, and do not believe in checks except when they are green! But I was always helped out by some comparatively rich man, who knew more than the others, and assisted me to cash the checks, going with me from house to house collecting together all the cash in town.

Near Granados are three extensive pueblos in ruins. There are also some interesting petroglyphs only two and a half miles north-west from town. The designs were rudely picked on a moderately smooth felsite rock, about forty feet above the bed of the valley. Some of the figures represent evidently the *patolachi* or deified dragon-fly found almost universally among the ruins of Arizona and Northern Mexico. The significance of the designs to the modern village Indians is the wind deity, beneficent in distributing the winds. There were also found the concentric circles, the conventionalized spiral and the meander design so common among the northern Indians, and still in use among the Moquis. All the figures of the deities are drawn in the characteristic style that we find in the north, their hands and feet defined with three radiating lines like a bird track.

We were now in the beginning of November. I had of late suffered considerable losses and annoyance by having my convoy of supplies stopped at a frontier custom house. The Mexican Government showed me, however, their good will by punishing very severely the inspector, who caused me this trouble, for going beyond his orders.

From Granados we took a more easterly course, at last being able to cross the Bavispe River, which for some time had been in flood on account of heavy rains. The country now gradually rose, and after a fortnight's march through mesquites and oaks we reached Nacory, a small, poor town at the foot of the Sierra Madre. Bacadehuachy, which we pass on our way, has a cathedral, built of adobe, but vast and extremely massive.

In this region Mr. Hartman, our botanist, found a new species of agave, which is strikingly beautiful, with delicate stripes of white, running in concentric circles on the rosette of lanceolate leaves, that constitute the plant. The flower stalk is 12 to 13 feet high.

Near Nacory we spent some time making excursions in the neighborhood and preparing for the crossing of the Sierra Madre, whose mighty ranges spread themselves before us one after the other like so many impassable barriers.

Through the inhabitants of the little hamlet I found out, that there are several deposits of fossils, or *huesos giganteos*, as they are called in these parts of the world, people imagining that the large fossils are remains of giants. In one valley, 6 miles south of Nacory, is a bed of clay 1½ miles long and 30 feet deep, and in the edge of the bed Mr. White found what he took to be a horn, 6 feet 8 inches long, and 26 inches around at its greatest circumference. It was not petrified, and in color it was a rich mahogany brown. It had no bone core, the hollow being filled with clay. Prof. O. C. Marsh, to whom I have given the measurements but no sample of the find, thinks it to be the tusk of a mammoth. Thus it would be the first time that this animal was found so far south.

After having received some supplementary provisions from Granados, I at last on the 2d December began the ascent of the Sierra Madre with a party of 30 men (including the scientific corps) and about 70 pack mules and burros. There are four great Sierras to cross, at an elevation varying from 8,000 to 9,000 feet, and the country, as may be imagined, is at times extremely rough. We made our own trails, 4 men going 2 or 3 days ahead of the main body, sometimes guided by Apache tracks. I had the trails cut zig-zag instead of the Mexican way of going straight up like a goat, and to this I attribute being at all able to pull through, as it saved the animals enormously. In some places our pack animals had to be led one by one alongside of yawning abysses. Many a time the beasts lost their balance and rolled down the mountain sides.

The Mexicans appeared quite accustomed to such accidents, and in fact they seemed to be in the regular line of Mexican travel. Strange to say, I never lost one animal that way, but, from December to February, 13 died from exhaustion or sickness caused by the cold weather and the poor quality of grass. Several times we had snow, once, in January, 7 inches deep, the coldest night (10 January) showing a temperature of 6° F. Christmas day the black bulb thermometer showed in the sun 150° F., while at night the temperature had been 22°, a difference of nearly 130 degrees. Even a rattlesnake was that day brought out by the heat. Water and grass were plentiful, but the grass was of poor quality.

The landscape was magnificently wild with high towering mountains and deep chasms, or again a seemingly infinite succession of ridges and plateaus, covered with pine trees never touched by an axe. The steep slopes in the valleys and crevasses are covered with slippery pine needles 8 or 12 inches long, while the pines tower up to a height of 100 feet; the forests have a remarkably young and fresh look about them; now and then on exposed places we met with trees split like matches, telling us what terrific winds sometimes may blow over these solitary regions.

In the cañons at an elevation of 6,000 feet Resurrection plants (*selaginella sempervivens*) cover the damp rocks and shady cliffs like a mat. Six or eight species of ferns, among them the beautiful maiden-hair fern, are also found, and the maples with their autumn coloring carried the Americans back to home.

Helianthus was on the 4th of December found growing in these cañons, while elders were observed with leaves and flowers at the same time. *Bambusa* forms here frequently a thick light green undergrowth of beautiful contrast to the dark shades of oak, elder and palms. A species of *salvia* with deep scarlet flowers is very striking. At an elevation of 8,900 feet, the highest reached on our route, was found a species of violet, a *lupinus* and a *vicia* (the latter two yielding an excellent fodder for cattle). Piñon trees and strawberry trees (*arbutus texana*) are frequently met with.

In the western parts of the Sierra Madre we found game scarce, as, for instance, in the country around the Bavispe River, but near the *mesas* and *cordones* the forests were alive with deer. Also turkeys were plentiful, but only one bear was observed. In the Gabianas River, a northeasterly tributary of the Bavispe, the fish were found in numerous quantities in all the water pools, it being just the time for their spawning (January); they were big suckers and trout, of excellent quality and very fat.

Among birds must be mentioned *campephilus imperialis.* This magnificent bird, which is 21 inches long and is therefore the largest woodpecker on the globe, was seen several times. They go in pairs, are not very shy, but cannot be killed except by the rifle. It is peculiar to them that they will feed for one or two weeks on one tree, so that in many cases the trees fall down. I brought back several specimens of this bird, which is extremely rare in the museums.

This Sierra Madre region is very rich in remains of a long ago vanished race of people, of whom history as yet knows nothing. Deserted pueblos containing square stone houses are frequently met with. They are generally found on top of the hills and mountains, and are sometimes surrounded by fortifications in the shape of stone walls. Isolated houses made of stone and clay and plastered, so that they look white at a distance, are also found, and the Mexicans call them *casas blancas.* The most interesting remains are, however, in the caves, which contain groups of houses, sometimes three stories high.

Trincheras, or stone terraces, are built across nearly every little valley, ten to twenty in number in some of them, evidently for agricultural purposes. On very steep mountain sides these terraces were astonishing structures, fifteen and even twenty feet high, and of great solid stones, in the cyclopean style of masonry. They were met with even at an elevation of 7,400 feet. In one place eight terraces were built within a space of 150 feet, the aborigines having gained by the enormous labor expended only 3,500 square feet, or in other words making room for 500 or 600 hills of maize.

On the 23d of January we reached the first settlement on the eastern side of the Sierra Madre, a Mormon colony called Pacheco, which had been three months without mail. From here I sent most of my poor animals to the Hacienda de San Diego, where an American, Mr. Galvin received us very kindly, while I myself with a party of twelve explored the upper part of the Piedras Verdes river valley for six weeks longer. We had had a rather laborious journey across the Sierra, and the animals were losing strength on the poor quality of grass and the cold of the nights, and they were beginning to give out. It became necessary to lighten their load by leaving half of the baggage, to be sent for a week or two later; and this made our progress slow and laborious. We had also been on reduced rations, with a scarcity of flour, and no other meat than that we could shoot for ourselves. These incidents, however annoying, form no great obstacle to real explorers, if only the results of their toil are satisfactory.

The most remarkable caves we met with were at the head of Piedras Verdes river, 6,850 feet above sea level. These caves contain groups of houses or small villages, and the houses are splendidly made of porphyry pulp, and show that the inhabitants had obtained a comparatively high culture. The dwellings were sometimes three stories in height, with small windows, and doors made in the form of a cross; and occasionally there were stone staircases. A very remarkable feature of these structures is that the walls, which are about 1½ feet thick, present a solid surface of as much as eight feet in height, all of one piece and whitewashed. The finds showed that these people cultivated maize, beans and cotton, and knew the use of indigo. There were seeds of two kinds of gourds, datems and palm seeds. A hunting stick like the boomerang of the Moquis, an arrow, a complete fire drill, bone needles, baskets, mats and threads of hair and plant fibre, sandals, and pottery were among the finds.

The caves, which number about fifty in a stretch of twenty miles, are from 100 to 200 feet above the bottom of the cañon, and the largest is some fifty feet high. At the entrance of one of the cave villages we were astonished to come upon a huge vessel made like an *olla* or water jar, twelve feet high and twelve feet in diameter. The sides of it were eight inches in thickness and as hard as cement, the frame being made of straw ropes, coiled and plastered outside and inside with porphyry pulp. At the bottom was a three feet high entrance, through which a person could crawl in; the top, which was only three feet wide, was also open. It made a marvellous impression, looking at a distance like a huge balloon, and seen near by it was as fresh as if made a week before. I believe it was for the storage of maize. In one of the other caves we met with three ruins of similar but smaller vessels, their circular bases only being left. There were built also some reservoirs for grain, dug down in the bottom of the caves. In the background of this cave, which in its looks reminded us of a cider factory, were the houses built in complete darkness. In the deepest caves the houses were built at the entrance, while in the smaller ones the houses were found at the back. It is to be noted that all the caves are natural.

We could see that the Apaches had occupied some of these caves, having left their pictures on the walls. There were also other pictures of comparatively recent origin. But the houses must be old, as we found on one thirteen coatings of whitewash.

One series of caves on the shady side of the cañon had been reserved for burial places. Here at a depth of three feet I dug out a number of bodies in a wonderful state of preservation, the saltpetre, which is mixed with the disintegrated rock, having for centuries preserved them so as to look like mummies. Several of them had their features, hair and eyebrows perfect; and these were photographed. The hair is very slightly wavy and softer than that of the ordinary Indian, almost silky in fact. They were small people and reminded us in appearance strikingly of the present Moqui Village Indians. The Moquis have, like the Zuñis, a tradition that they came from the south.

The bodies were lying in rows, on their left side with the knees drawn up, and facing the sunset. Round their loins were wrapped three layers of cotton cloth and mats. Turkey feathers and feathers of the great woodpecker, mixed with cotton wadding, were found between their legs. There were no ornaments of metal, but ornamental shells and fine straw bracelets around their ankles and wrists which fell to dust on being touched, and belts of straw were found on the bodies, while near their heads invariably stood one or two *ollas* (water jars). We found with one body a bundle of "devil's claws" (*Martynia*). These are used by the Mexicans of to-day for mending broken pottery. They drill holes through the pieces and pass into them one of these claws, just as we should a rivet. The claw is elastic and strong, and serves the purpose very well.

We spent six weeks on the Piedras Verdes, where of late years some Mormon settlements have been made. They seem to be doing well, but they complain of the climate and the difficulty of raising crops; and they are gradually retreating to the plains at the foot of the Sierra, where they have prosperous communities in the fertile Casas Grandes valley. They are making explorations in a southerly direction in the mountains.

The country here also abounds in mounds, some of them monstrously large. Here would be a fine field for investigation and excavation for many years to come. With my limited force of men I could not make as extensive excavations as I wanted, but still a very considerable amount of work has been and is still being done. We have unearthed a great many polished stone implements, about 300 jars, most of them decorated and some in very odd shapes, and several specimens of a big stone wheel and a stone cylinder fitting into it, probably used for some sort of game.

The mounds contain houses, and, as usual, most of the relics are found near the dead bodies, which are always buried under the floor, partly under the wall. These people must have been there previous to the cave and cliff dwellers, but who they were it would not yet be safe to say.

It would be premature to express any opinion as regards the antiquity of races or the people that once inhabited the now solitary regions of the great Sierra Madre district. I am just in the midst of my explorations. I have at present fourteen men in the camp, which is ten miles south of Casas Grandes, the mineralogist, Mr. H. White, being in charge during my absence; they are occupied with excavating a large mound close to the camp and also in collecting plants and birds. I have picked men, a most complete outfit of scientific apparatus, and all things necessary for an exploration of this kind, and everything is in readiness for a start again as soon as I return.

It is my ardent desire to continue these explorations, now just successfully commenced, for two years more, and I am glad to believe that I may rely upon the continued co-operation of the two learned Societies, under whose auspices these operations are conducted, which cannot fail to be of the utmost importance for the early history of this continent, as well as for the physical and biological conditions of that part of the country. My intention is to investigate accurately the language, habits and customs of the primitive people of the Sierra

Madre by living with them as I did with the natives of Australia, and I am sure that interesting results may be looked for in this virgin soil, in ethnology and archæology, as well as in other branches.

I have shipped over thirty cases of collections to Bisbee, Arizona, filled with objects of archæological, anthropological, ethnological and zoological, botanical and mineralogical interest. Over 400 photographs have been taken, and topographical and meteorological work has been done.

GEOGRAPHICAL NOTES.

BY

GEO. C. HURLBUT, *Librarian.*

THE CONGRESS AT BERNE.—The International Congress of Geographical Sciences held its sessions at Berne during the week, August 10–14, 1891. Representatives from the Societies of nearly all countries took part in the proceedings.

The Congress was opened, at 9 o'clock in the morning of August 10, the chair being occupied by the President, M. Gobat, with an address by M. Droz, of the Federal Council.

M. Gobat announced the presence of official representatives from the Governments of the following Countries: Belgium, Brazil, France, Hungary, India, Italy, Mexico, Netherlands, Portugal, Spain, Sweden, United States and Wurtemberg. In a few words he gave expression to the sorrow felt by the Congress at the tidings, unhappily confirmed, of the massacre of the explorer Crampel and his companions.

Mr. Robert N. Cust, delegate of the Royal Geographical Society, of London, spoke on the work of the European and American missionaries in Africa. He was followed by Dr. von Steinen, of Marburg, who discussed the subject of the Caribs and their origin; and Prince Henri d'Orleans then read a paper on his journey to Tibet with M. Bonvalot.

In the afternoon the members paid a visit to the geographical exhibition, and then resumed the sitting. Dr. Penck explained his ideas on the construction of a map of the whole world on the scale of one-millionth. This map would cover a surface of 510 square metres (about one-fifth of a square mile), but, if limited to the Continents and the known lands, it would cover about one-fourteenth of a square mile. The map would consist of 1,000 sheets. At Dr. Penck's request a committee was named to report upon his proposition.

M. de Lannoy de Bissy then gave an account of his labors in working out a map of Africa on a scale of one two-millionth.

Mr. F. A. Stout, of New York, described the advantages presented by the physical features of Nicaragua and its great lake for the construction of a ship-canal; and Mr. A. R. Eckfout, of Java, spoke on the progress made in the construction of railways in the Sunda Islands.

The morning of the 11th was devoted, in the first place, to the question of the initial meridian and the universal hour. Mr. Förster, Director of the Berlin Observatory, submitted a report, which proposed the reference to the Committee on the map of the world of a resolution, calling upon the Swiss Federal Council to take the initiative of an international understanding as to the introduction of a single initial meridian, a universal hour and the application of the decimal system to the measurement of time. Mr. Förster rejected the system of horary gores (*fuseaux horaires*).

He showed that this system was nothing more than transitional and that it would press, at last, with an intolerable weight upon scientific pursuits as well as upon traffic and the civil life of communities. He proved that for science as well as for all other forms of human industry, it was indispensable to have a local hour, though exception might be made in favor of railroad and telegraph service.

Col. Coello, president of the Madrid Geographical Society, advocated the universal hour and the reference to the Committee; and Prof. Mareuse, of Paris, spoke in favor of the horary gores, already adopted in many countries. There are twenty-four of these gores, each of fifteen degrees. M. Bouthillier de Beaumont was in favor of an initial meridian, passing through Bering Strait.

Father Tondini di Quarenghi, whose zeal knows no abatement, insisted upon the advantages of the meridian of Jerusalem; and after a very lively discussion, the whole subject was referred to a Committee.

Prof. Amrein treated the subject of the modern sentiment of nature, and, more particularly of alpine nature. Prof. Knapp presented his observations on the foreign population in Switzerland (Frenchmen 53,653, Germans 95,262, Italians 41,500), and M. de Claparède described the botanic garden *Linnæa;* and the following resolution was adopted:

"The fifth International Congress of Geographical Sciences, sitting at Berne in 1891, recognizing the interest presented by the alpine botanic garden *Linnæa*, at Bourg-Saint-Pierre (Valais), for the study of the botanical geography of all the elevated regions of the globe, resolves to recommend this undertaking to the good will and the support of all geographical societies."

Maj. Post, U. S. A., described the operations of the

U. S. Coast and Geodetic Survey, which was organized and brought into working order by Prof. Hassler, a native of Switzerland. He explained, also, what had been done by the U. S. Geological Survey in its special department as well as for the topographical map of the United States, now in course of publication.

M. Faure offered a detailed study on the state of geographical instruction in Germany, America, England, Belgium, France and Switzerland. Mr. Scott Keltie spoke of recent geographical progress in Great Britain ; and he was followed by Frère Alexis, of Paris, on popularizing geographical knowledge, by Mr. de Haardt, of Vienna, on the importance of ethnography as a constituent part of geographical instruction in intermediate schools, and by M. Oppel, who spoke of maps of political economy and of exploring expeditions.

In the afternoon Prince Roland Bonaparte presented his recent publications, and General Annenkoff made an address on the subject of the importance of geographical instruction in the XIX century, as a basis of emigration and colonization. He made a comparison between the events which occurred at the close of the XV and in the XVI century, and those which pass under our eyes at the present time. "From 1492," he said, "to 1522, we stand in the presence of an immense renovation, a veritable intellectual and social revolution, an irresistible movement towards the unknown. . . . While Columbus was discovering America and was taking possession of it in the name of Spain, Vasco da Gama was arriving in India by the Cape of Good Hope. The expedition of Gama constitutes the national epoch of the Portuguese. Gama and Albuquerque seem to belong to poetry rather than to history. It is a mixture of the lust of gold with religious proselytism, and an unmeasured need of impetuous expansion through the world, that strike us when we think of this people, occupying so small an area in Europe. Only fifteen years after the death of Columbus, Magellan discovers the long sought-for passage, and the first circumnavigation of the globe is accomplished.

"We are surely struck with amazement, when we think that almost at the same time, or, at least, within a very short period of time men of great genius, like Christopher Columbus, Vasco da Gama, Ferdinand Cortés, Pizarro, Americus Vespucius, Marco Polo* and many others make great discoveries that revolutionize the globe. . . . After this beautiful and glorious epoch, there comes a time of relative calm, a calm that lasted till the second half of the XIX century, when there begins again a feverish activity, a desire, manifesting itself like a disease, to become acquainted with far-distant countries as yet unvisited and to unite them to the civilized world, and to open in this way a new field to human activity."

Gen. Annenkoff then passed in review the work done in Africa and in Asia, in Australia and in America, by the travellers and explorers who have left almost no region of the globe untrodden. He described the expansion of colonies into great nations, the increase of population in the Old World and its overflow in emigration. "Like Alexander," he said, "and with greater reason than Alexander, we find the world too small for us."

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* General Annenkoff knew of course, but forgot for a moment, that Marco Polo lived two centuries before Columbus.

In conclusion, he proposed a resolution for drawing up a uniform international series of questions on the fitness of different countries for colonization; and, after some discussion, this resolution was unanimously adopted. Mr. de Coczy, Director of the Hungarian Geological Institute, described Count Szechenyi's travels in China. The geography and natural history of Bismarck Archipelago were treated by Count Pfeil, of Berlin.

The day was marked by an incident, which carries with it a lesson in manners, if not in geography. Mr R. N. Cust, who addressed the Congress the day before, had distributed in a printed form his paper on the occupation of Africa by Christian missionaries, with the inscription: "International Congress of Geographical Sciences, at Berne, 1891."

In this pamphlet occurred the following sentence (here translated from the French) applied to the Germans: "With a brutal cynicism they have laid hands upon what they could take, without concerning themselves as to the feelings of the people and without thinking of the day, which will surely come, when they will have to render an account." *

These international sentiments, so courteously expressed, did not win the approbation of the Germans.

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* It is due to Mr. Cust to observe that his language, though apparently restricted to the Germans, is nothing more than the outcome of his long-settled convictions with regard to the spiritual nature of Europeans in general, or perhaps, of continental Europeans.

Writing in the *Proceedings* of the Royal Geographical Society for August, 1886, he said that the island of Djerba, on the coast of Tunisia, had "a population of 35,000 souls, and 300 Europeans."

Mr. Cust's devotion to the cause of the Africans and his faith in their high qualities enforce this explanation of his words, since the natural opposite of the African is not the German, but the European.

They spoke of withdrawing from the Congress in a body, but allowed the matter to pass, on reflection, and accepted the following declaration made by the President, M. Gobat, and entered in the bulletin of the Congress:

"Thus far there have been heard in the meetings of this Congress no words that were less than courteous and obliging for all nations. No one has had occasion of complaint.

"We trust that cordiality has not ceased to prevail, also, outside of the Congress, among the different representatives. There has been distributed, however, a pamphlet on the work of the missionaries in Africa, and this pamphlet contains expressions offensive to a nation represented in the Congress. We leave the responsibility of those utterances to their author, and we are far from assuming the position of censors; but we should have preferred to have these expressions remain completely foreign to the Congress. In the hope that the most entire concord will preside over our deliberations to the end, I declare the incident void."

The session of August 12 opened with remarks upon his travels in Java, by M. Fritz Du Bois. M. Arthur de Claparède gave his recollections of the Philippines; and M. Napoléon Ney, of the Comm. Geographical Society, of Paris, made a report on the Transsaharan Railway. He showed that the enterprise was comparatively an easy one, that it would return a more than sufficient interest upon the capital, and that it would be of incalculable advantage to France and to the cause of civilization. He called upon the Congress to confirm by vote the resolution adopted at Brussels in 1879, to the effect that the construction of a railroad from the African sea-coast to the countries of the interior is very greatly to be desired. The line of the road is to be from the Mediterranean coast to Lake Tchad, and thence directly to the Niger.

Mr. F. A. Stout, of the American Geographical Society, read a paper on the pretended discovery of the source of the Mississippi by Capt. Willard Glazier. This paper was referred to a special committee.

On the 13th of August Professor Schmidt, of Vienna, explained the method employed in Austria for geographical instruction of the lower classes in the gymnasia. M. Bouthillier de Beaumont presented his planisphere, and M. Chardonnier, of the Berchem-Sainte-Agathe Institute for the Deaf and Dumb, proposed a new division of the earth in place of the accepted torrid, temperate and frigid zones. The subject of reform in the spelling of geographical names occupied the attention of the Congress, which unanimously recommended the report made by M. Barbier, of Nancy. M. Forel spoke of the Subalpine lakes, and the hydrographic charts representing them ; and M. A. Delebecque, of Thonon, presented his own maps of the lakes of Annecy, Bourget and Geneva. The Congress expressed the hope that these surveys would be extended by the States, so as to embrace all the lakes.

A superb map of Etna was presented by its author, Prof. Emile Chaix. The subject of relief maps was attentively considered. There were discussions on meteorology and on geographical bibliography, and a resolution, looking to the institution of international committees for preparing this bibliography in each country, was offered by M. Guillaume, Director of the Federal Statistical Bureau, and adopted.

August 14, there was a debate on the report of the Committee on the initial meridian and the universal hour. It was finally decided by a unanimous vote to refer the question to delegates of the Powers, to meet at Berne. Resolutions were also adopted concerning the advice and information to be furnished to emigrants, and the new method of geographical instruction.

It was proposed to hold the next Congress at Genoa, on account of the Centenary of Columbus; but, after discussion London was selected as the place, if the decision met the views of the Royal Geographical Society. On the proposition of General Annenkoff, the Congress voted that all the Societies be invited to send delegates to take part in the celebration of the Columbus Centenary at Genoa. The president, M. Gobat, then offered to General Annenkoff, in recognition of his great achievement of the Transcaspian Railway, the diploma of Honorary Membership in the Geographical Society of Berne; a fitting close to the deliberations of the Congress.

Of eighteen resolutions voted by the Congress, M. de Claparède in the *Journal de Genève*, of August 22, notes several which must be, as he thinks, fruitful in good results.

First of these is the decision with regard to a map of the world, on a scale of one-millionth, the sections to be limited by the meridians and the parallels. The commission on this map is constituted as follows: Germany, Dr. Supan of Gotha; Baron von Richthofen, Berlin; Austria-Hungary, Gen. von Arbter, Director of the Imperial Geographical Institute, and Prof. Penck; Spain, Col. Coello; France, M. Maunoir and M. F. Schrader; United States, Maj. Powell and Prof. Mendenhall; Great Britain, Gen. J. T. Walker, Sir Charles Wilson, Mr. E. G. Ravenstein, and Mr. Scott Keltie; Italy, Prof. Guido Cora and Gen. Ferrero; Portugal, Prof. Cordeiro; Netherlands, M. Eckstein; Russia, Gen. von Tillo; Sweden, Maj. Selander; Switzerland, Col. Lochmann.

The second is the creation of an International Committee to draw up a list of questions, the answers to which shall furnish particular information with respect to colonies and the little known regions to which emigration is directed.

The third is Resolution No. 4, by which the Congress passed upon a question of fact, all the more urgent that it was of a somewhat delicate nature, in adopting the unanimous report of the Special Committee adverse to Capt. Willard Glazier's claim to be the discoverer of the source of the Mississippi.

The fourth is Resolution No. 5, on the subject of the Initial Meridian and the Universal Hour. By this Resolution the Congress gave expression to its desire that the "Swiss Federal Council, acting in concert with the Italian Government, which has lately taken the initiative, invite the other Governments to expedite the study of the questions of the initial meridian and the universal hour, as well as that of the utility of horary gores in international relations and in public life, and the assembling of a Committee of delegates, *provided with full powers*, to regulate *once for all* these various questions."

M. de Claparède says very truly that it is a matter of secondary importance, whether the meridian selected be that of Bering, or Ferro, or Greenwich, or Paris, or Rome, or Jerusalem. It is essential only to have one universally accepted meridian.

Fifth comes the Resolution (No. 7) by which the Congress recommends the alpine botanical garden *Linnæa* to the good-will of all geographical Societies.

The sixth place is held by the Resolution No. 8, which calls upon the Geographical Societies to use their influence for the establishment of special Chairs of Geography in the academies and universities.

AN INTERESTING SPECULATION.—Mr. E. G. Ravenstein contributed to the *Proceedings* of the Royal Geographical Society for January, 1891, an article on the "Lands of the Globe still available for European Settlement."

In this most instructive paper, Mr. Ravenstein showed that the increase of population in a decade was, for Europe, 8.7 per cent., for Asia, 6 per cent., for Africa, 10 per cent., for Australasia, 30 per cent., for North America, 20 per cent., for South America, 15 per cent.; and for the whole earth, 8 per cent. He put the present population of the earth at 1,468 millions. "By the close of this century," he said, "the 1,468 millions who now dwell upon the earth will have increased to 1,587 millions; in the year 1950 there will be 2,332 millions; in the year 2000, 3,426 millions; and in the year 2072, or 182 years hence, there will be be 5,977 millions. These estimates are not presented as a prophecy."

They sound, however, like the first notes of the last trumpet, for Mr. Ravenstein elsewhere says: "I therefore assume that this world of ours, if brought fully into cultivation, can supply 5,994 million human beings with food and other necessary products of the vegetable kingdom."

Clearly, something must be done by those who feel their responsibility to these ghostly millions of the year 2100, and M. Paul Leroy-Beaulieu is the first to come to the rescue. In two articles on *The Influence of Civilization on the Movement of Population*, translated in the *Journal* of the Royal Statistical Society for June, 1891, M. Leroy-Beaulieu notices Mr. Ravenstein's paper and presents some objections to its argument:

"Mr. Ravenstein," he says, "exaggerates the nourishing capabilities of the globe in assuming that agricultural science will remain in its present condition. It is very doubtful that the earth will be able to feed, cultivated as is the greater part of the European soil, the 5,994 millions whose existence is anticipated by Mr. Ravenstein in one hundred and eighty-two years' time, that is, in the year 2072. But, on the other hand, it is certain that the rate of increase of 8 per cent. in ten years in the numbers of the population, even supposing it to be an accurate one (and for the generality of the world it can only be a hypothetical one), cannot be maintained indefinitely. We have shown that the degree of civilization, or rather the special rate of European civilization, tends to diminish it."

In making his demonstration, M. Leroy-Beaulieu cited the well-known case of France, where the birth-rate fell from 25.4 per 1000 for the period 1870–1880 to 23.4 in the year 1888; but he added that all other civilized nations appeared to be tending in the same direction.

In Austria and in Hungary the birth-rate was the same in 1882 or 1883 as in 1865, but in Italy it fell from 38.3 to 36.9; in Prussia it fell from 39.1 to 36.3; in the Netherlands from 35.9 to 35.1; in Switzerland from 35.5 to 32.5, in Belgium from 31.4 to 30.5, in England from 35.5 to 33.7, and in Scotland and Ireland the birth-rate fell to the same level as the French, namely, from 24.9 to 23.6 per 1000.

His conclusion is that what it has been agreed to call civilization, which is really the development of material ease, of education, of equality, and of aspirations to rise and to succeed in life, has undoubtedly conduced to a diminution of the birth-rate.

He believes it to be impossible to determine the number of inhabitants that the earth will feed; but he regards it as certain that, in a very short time, in fifty or sixty years, and possibly in thirty or forty, when the New World has doubled or trebled the number of its inhabitants, a very decided rise in prices will be experienced in the Old World.

This period of sixty years will bring us to the year 1950, when the population of the United States will number, according to Prof. H. S. Pritchett (*Quarterly Publications of the American Statistical Association, June, 1891*), not less than 190,740,000. Prof. Pritchett's "Formula for predicting the Population of the United States" betrays no sign of the faint-heartedness, which marks Mr. Ravenstein's calculation. The 190,740,000 inhabitants of these United States, in 1950, will have increased, in the year 2100, to 1,112,867,000; in the year 2500, to 11,856,302,000; and in the year 2900, to 40,852,273,000. Fortunately for mankind, the formula ceases working at this point.

THE BRITISH ASSOCIATION AT CARDIFF.—The following note on some of the proceedings in the Section of Geography of the British Association is made almost without change from the reports in the London *Times:*

Dr. Robert W. Felkin read a paper on "Acclimatization." He said that on that subject there were two schools of thought—the one regarding acclimatization as impossible, the other more sanguine and pronouncing it possible. Probably the truth would be found to be a mean between the two. In reference to Europeans becoming acclimatized in the tropics, those factors which prevent it were heat, cold, damp, various endemic diseases, especially malaria, and those constitutional conditions induced by climate which either destroy the immigrants or diminish their fertility after one or two generations. Progress has been made during recent years in enabling persons to reside longer and to enjoy greater health in the tropics.

Colonel Sir Francis de Winton said life in the tropics was possible under certain simple rules—(1) a young man should not go there till the constitution was set, say 24 or 25; (2) he should be careful in clothing; (3) temperate in all things—living simply, but well; (4) always have work—the mind should be constantly employed—not overwork, and a certain amount of amusement.

Miss Clarke read her paper on "The Aborigines of Western Australia." She said: The monastic settlement of New Norcia, 70 miles from Perth, in Western Australia, is the most striking refutation of the generally received belief in the irredeemable degradation of the Australian aborigines. Founded in 1846 by two Spanish Benedictines, Fathers Serra and Salvado, who gradually won the confidence of the natives by sharing their pursuits, it now forms a flourishing industrial colony, consisting of a monastery, church and schools, surrounded by a vast cultivated domain, workshops for different trades, and a native village of about 50 cottages inhabited by as many Christian families. One of the girls trained here is in receipt of a Government salary as head of the post and telegraph office, in which, when absent on sick leave, she was efficiently replaced on short notice by one of her companions. The boys, too, learn with great facility, and many of them prove steady tradesmen or trustworthy servants and foremen. In the wild state these aborigines are cannibals who devour the flesh of their own kinsfolk and exhume for food bodies after three days' burial. They believe in an omnipotent creator and an evil principle, but do not propitiate either by worship; they regard the moon as maleficent, the sun as a benefactor, and the stars as a numerous family sprung from the marriage of several couples amongst them. The soul is believed to survive after death in a disembodied state, and to transmigrate into the body of others, remaining in that of the last of the party who approach to invite it. They are grouped in families of ten or twelve, under the absolute rule of the head, but no longer, as formerly, form tribes by the agglomeration of these families. The men are prohibited from marriage before the age of 30, have often but one wife, sometimes two, and a larger number only when they adopt those of relatives or friends left otherwise unprotected. Defective infants and superfluous girls are killed, but the others are reared with great tenderness, which is also exhibited to aged parents.

Miss Clarke missed a great opportunity by failing to recommend the killing of *superfluous* girls in civilized countries. Are Europeans less tender-hearted than West Australians?

Colonel Holdich then read his paper on "The Application of Indian Geographical Survey Methods in Africa." Colonel Holdich said: These surveys may be assumed to be of a geographical rather than a revenue class, and to have in view objects similar to those obtained by the geographical surveys carried out by Indian survey officers. An outline of the methods proposed may be summarized as (1) the adoption of a rapid system of triangulation along the most important lines for first survey; (2) the extension of a graphic system of mapping from these lines by means chiefly of native labor. The most important lines for first survey are the international boundary lines. There is a great necessity for a topographical acquaintance with the boundaries adopted. Only a small portion of them apparently follow permanent natural features, the rest being defined by rivers, etc., which are dangerous and uncertain. It would appear, then, advantageous to commence triangulation along the boundary lines. This is a national or international question, and State assistance might very well be expected and Imperial resources drawn upon for carrying it out. He then asked, (1) What are these resources? (2) What is the nature of surveys already existing in Africa? (3) What is the nature of the survey we ought to build up? Replying to 2 and 3 we find that if a continuous and comprehensive scheme is to be adopted, with unity of design for all the scattered districts of the African colonial system, nothing has very much been done as yet which would assist us in carrying out our scheme. This scheme should be largely borrowed from experiences in Asia. A consideration of it shows (in reply to 1) to what extent Imperial survey resources might be utilized during the processes of laying out the preliminary lines of triangulation. Then followed a short consideration of the general topographical processes as carried out by natives of India, of the value of such native labor, and of the possibility of raising survey establishments in Africa similar to those which have done such excellent work in Asia.

Mr. Meakin read a paper on "Morocco as a Field for Geographers." Only a small portion of the country is at all fairly known, and on the whole it may be considered, not only for the geographer, but for all scientists, as virgin soil. Only one traveller has explored the famous Atlas to any extent and given to the world satisfactory maps and other topographical *data*. This is the Baron de Foucauld, who travelled some years ago in the disguise of a Jewish Rabbi. The failure of all others who have attempted this task has been due to their unsuitability, chiefly arising from their ignorance of the people and the language. Rohlfs penetrated as far as de Foucauld, on the whole, but had no means of preserving a scientific record. To explore the Atlas abundant adaptability is needful, an intimate acquaintance with the people indispensable, and, as a rule, native costume is imperative. A satisfactory *raison d'être* must always be placed before those whose territory is visited. The only authority with regard to the flora and geology of any portion of the highlands is derived from an excursion of Messrs. Hooker and Ball for a short distance beyond Marrákesh (Morocco city). Some of the Christian slaves of bygone centuries have left us valuable itineraries, but the sum of all that has been accomplished is, after all, very meagre. Many have posed in England as explorers who have merely enjoyed an extended picnic in easily accessible parts. There is consequently no reliable map of Morocco, the only real attempt having been made by Captain Baudouin for the French War Office, in 1848. This is compiled partly from actual observation and the records of travellers, but for the most part depends on the vague information of natives. The configuration of the Atlas is considerably different from that shown on most maps. Instead of one long chain stretching in a south-westerly direction, it is in reality composed of three more or less parallel lines, which are best defined as the Medium, the Great, and the Lesser Atlas, the first-named being the northernmost and the last bordering on the Sahara. Of these only the centre of the Great Atlas has been to any extent explored. With the exception of its northern extremity towards Fez, the Medium Atlas and that portion of the Great Atlas which lies south of it are quite a *terra incognita*. De Foucauld and Rohlfs have skirted the

Lesser chain, and the whole have been crossed at a number of points, though nothing much is known. It is a spur of the Great Atlas which runs off west to Cape Ghir, and this has been crossed many times. The rivers of the south side of the Atlas are mostly swallowed up in the sands of the Sahara after forming fertile oases, while those of the north water the rich alluvial plains of Morocco proper. The perpetual snows of the Great Atlas furnish an abundant supply in the hottest weather, and this mighty back-bone shields the whole country from those desert winds which make the summer of Algeria unbearable. Even the rude operations of the natives have sufficed to prove the richness of this range in valuable minerals. Wild beasts are few, and dangerous ones almost extinct. These mountains are the home of the Morocco Berbers, who offer a most interesting field for scientific research. In a paper to be read before the Anthropological Section of this gathering the writer has endeavored to give a brief sketch of this little known people. They are, however, not the only inducement to further exploration, for very little is known of the troglodyte dwellings which line the mountain sides, and as little of the many ruins left by some former occupiers, ascribed either to Christians or the Romans. Then, too, there is much to be learnt about the Jews who live among the Berbers, as distinct as Jews could be from those who haunt the plains.

Lord Lamington read a paper on his visit to the Shan States on the Siam border. The paper dealt with his journey from Chieng Mai, in the Laos country, to Mung Phoong, in the Sibsong Pana. Starting with Mr. Archer, our Consul at Chieng Mai, he described the country as far as the Meh Teng, a river that flows into the Meh Ping, as being already very productive, and considered that it only required opening up by improved means of communication, an increase of population, and security of property to develop into one of the richest territories. On leaving the Meh Teng they passed over a watershed into the valley of the Meh Hang, an affluent of the Salween. The frontier of our Shan States with Siam lies somewhere in this region, but it has not been yet defined. Arriving at Mung Tuen, they met the British party that came from Burmah to take part in the Anglo-Siamese Boundary Commission. From this place he described a visit to the great cave which the river Meh Hang enters and tunnels its way under a range of hills. He then narrated the journey of the Commission to Mung Sat, and thence down Meh Khok river by a path through the jungle which presented great difficulties from its not having been used for years. For more than three weeks they had seen no habitation, those villages they did pass all having been destroyed. It is the constant petty wars of aggression between the various States that make it an intricate task to settle who has the rightful claim to any particular district. Leaving the Meh Khok some two days' journey above its junction with the Meh Kong, the Commission crossed over a watershed into the plain of Chieng Sen, which is reckoned as over 100 miles long, and of an average breadth of ten miles. This was a welcome change to the party after spending weeks of hard travelling amongst hills, and who, owing to the dense jungle, were never able to obtain a distinct view. He described the plain as being of great fertility with the capacity for further development. At Hongluk, a Shan village at the northerly end of the plain, he left the Commission and travelled alone on his way to Tonquin. Four days' travelling brought him to the river Meh Kong by the village of Kyang Lap. The channel of the river between the banks he considered to be 600 yards broad, but as it was the dry season, the actual breadth of water was only 120 yards, though very deep. A few more days' travelling took him to Mung Sing, the capital of Kyang Kheng, which, though only five years established, shows every sign of being an important place. It is situated in a large plain, well populated, with a series of fertile valleys stretching almost the whole way to the Meh Kong. He dwelt on the possibilities of the great agricultural wealth that could be developed in the State of Kyang Kheng as an argument for urging the Indian Government not to be afraid of accepting the position of being the suzerain Power. The State was hitherto tributary to Kyang Tung, which came under our protection as one of the States of the old kingdom of Ava. But the Tsawbwa of Kyang Kheng, annoyed at his nephew being made Tsawbwa of Kyang Tung, withdrew his allegiance, and placed his State under the protection of Nan, a northern frontier State of Siam. Lord Lamington went on to say that after he had been there the Commission paid a visit to Mung Sing and found the Tsawbwa quite ready to return to his old and proper allegiance. This was most important, as then any railway made up the valley of the Meh Kong would of necessity pass through British territory. A railway to the plain of Chieng Sen was, on Mr. Holt Hallett's showing, sure to be constructed some day, and then the prolongation of it into the rich district of the Sibsong Pana and Yunnan would rest in the hands of the British.

It is to be regretted that Lord Lamington says nothing of the arguments that worked with the repentant Tsawbwa. They were possibly not unfamiliar to the British Association, but their statement would have a certain value.

Mrs. French Sheldon read a paper entitled "A Visit to Kilima-Njaro and Lake Chala." She had no thought of geographical exploration.

Her plan had been to study native habits and customs free from the influence of civilization and in their primitive condition. She started on her journey without companionship or the assistance of a lieutenant, and not even with a doctor. The expedition of 130 men was personally directed, disciplined, and led by herself. Her English stewardess was taken seriously ill, and the expedition had to carry her for three-fourths of the distance in a most dangerous condition. The majority of her caravan party were untrained and unreliable, and until she gained complete mastery over them there was a disposition to be rebellious. The hazard, however, was taken with eyes open, and the responsibility was incurred in order that a portion of the country should be visited which was solely inhabited by natives who had never seen the face of white men or women. She received before starting many hints from men like Mr. Stanley and other travellers. She had, besides, read most of the books on the subject. Within a week from the time she reached Zanzibar her caravan was organized. She had expected and counted on hardships in giving up her home, but she did not expect to have had, day after day, in the solitude of the desert, to contend with new difficulties which arose, and to overcome which almost needed more than human aid. There was nothing left to her to but to gain absolute control over her men. This could only be done by an application of the rawhide whip. She often lay awake at night trying to decide what would be the best thing to do. Had she consulted her own first impulses she would have shot more than once every man in the caravan. She found, however, that a certain degree of patience had to be cultivated, and when punishment had to be meted out it was necessary to wait patiently for the execution of orders. This delay was one of the most difficult things she had to contend against, because of her impatience to have her orders executed. The hardship entailed by the climate was also very great. The rains had begun to fall, and when marching she and her party were frequently up to the armpits in water or half sunk in marshes. It was interesting to observe that the natives, instead of taking to flight on the approach of her party and deserting the caravan paths, came down to meet her. By some system of communication all the tribes seemed to know of her approach, and it afforded her no little amusement to hear the native men and women describe her in their own language as "woman master." They seemed not to be able to comprehend the position of a woman in charge of a caravan ; but, instead of showing her rudeness, the natives from one coast to the other, on routes which passed through savage and wild districts, showed nothing but deference and homage.

She therefore thought that a great deal depended, not on the fact as to whether women or men went among these people, but on the manner in which they went and how they conducted themselves. If travellers acted in a manly and straightforward manner and kept their word of honour inviolable no difficulty was found. It was the person who promised and never fulfilled who got into difficulty, and then the natives got into the habit of thinking that the white man was the biggest liar in existence, with the result that antagonism was engendered and Europeans were paid back in their own coin. Without egotism she might say that the natives treated her not only with homage but as if she were a potentate. She frequently received as many as ten oxen as a mark of homage, and the chiefs would frequently send messengers and couriers ahead in order to find out whether she intended to pass through their territory either going or returning. But she went straight ahead to Kilima-Njaro. Sometimes the natives reconnoitred her approach, and held aloof. On those occasions she went frankly towards them with extended hands containing some bright attractive offering as a present. She went into Africa with all delicacy and womanliness, but quite prepared to accept things as they were there. On one occasion a band of warriors appeared at her camp in an entire state of nudity. Next day, however, they reappeared clothed as her own followers were, thereby showing that they had divined that their original state was distasteful to her. She had been invited by both the men and women of tribes to attend their marriage feasts, dances, and funeral services, which was a very rare experience for any one outside the tribe to enjoy. On the 26th of April she started with a portion of her caravan to visit Lake Chala, near Kilima-Njaro. Descent to the lake could only be obtained by sliding down the rocks, crawling over prostrate trees, forcing a way through primitive forests, and swinging from tree to tree like monkeys. When she reached the bottom of the cliffs surrounding the lake she thought that it was the most sacred looking place she had ever seen. Owing to the overhanging cliffs and the strange murmur of the water the situation was weird in the extreme. She felt herself to be in a state of tremor and marvelled at the curious aspect of the waves on the face of the lake. She also puzzled very much over the origin of those waves, and whether or not there was a current to cause them, but there was neither inlet nor outlet in the lake to account for them. A kind of raft was constructed and the lake was circumnavigated. She was astonished at having to make constant *détours* into various little bays, and her original estimate of the size of the lake, owing to the time taken in the journey, was eight miles round. But this would now be modified into a distance of six miles, a figure which approached more nearly scientific accuracy. The under-currents in the lake were very difficult to overcome, so much so that they were compelled to keep the boat near the shore. By means of a plummet the bottom of the lake was touched at one point at fifty yards' depth. In her return journey she met with an unfortunate accident. While being carried in a palanquin across a swollen torrent the porters stumbled, and she was thrown from a height of 30 or 40 feet. She was dropped by her cariers a second time, and injury to her spine was the result.

Sir Francis De Winton, speaking with an intimate knowledge of the many difficulties which attended caravan travelling, stated that the sufferings and difficulties undergone by Mrs. Sheldon in order to carry out her object testified to her great courage and devotion. When he heard originally of the intended expedition he had many misgivings as to its probable success, because Mrs. Sheldon chose the worst time of the year for her journey—the beginning of the rainy season. He was glad to hear of the patience displayed by Mrs. Sheldon in her dealings with the porters because it ought to be recognized by intending travellers in tropical Africa that nothing but patience would succeed with the natives. He further thought that Mrs. Sheldon's lecture showed that she was possessed of careful and accurate powers of observation, and he trusted her observations would be of great use to those who might follow in her footsteps.

Surgeon-Major Ince thought that Mrs. Sheldon had set an example to future African explorers as to the true manner in which the natives should be approached.

Mrs. French-Sheldon's methods have simplicity and directness. Even a Zanzibari can understand discipline in the shape of a raw-hide whip applied to his back, but is it quite sure that he appreciated the patience displayed by his *woman master* between floggings? It is something to have the approval of Sir Francis De Winton and Surgeon-Major Ince, but the Zanzibaris must have had a sharp sense of the lady's confessed impatience to be up and at them, with her more than human aid. It is natural, perhaps, but strange that Mrs. Sheldon seems to feel no remorse for having introduced into the native Paradise the contaminating idea of clothes, the livery of a degraded civilization, from which "her own thought drove her like a goad" to primitive habits and customs.

Dr. Henry Schlichter read a paper on "The Geography of South-West Africa." He said that South-West Africa was in many respects only imperfectly known to geographers. Our information about Great Namaqualand, the western Kalahari, the large Kaoko district, and the belt between the the Atlantic Ocean and the highlands of the interior was by no means satisfactory. Since Germany had acquired territories in South-West Africa many scientific and other travellers had traversed the German sphere of influence, and thereby contributed to our knowledge of the country. But geographical science had not yet gained much by these recent German explorations, for, with the exception of a few books and scientific publications, all the information had reached the public and been preserved only in various German papers and periodicals, mixed with many more or less unimportant colonial matters. Moreover, the old explorations of South-West Africa needed a revision. Mr. Theal, who had searched the archives of the Cape Colony, had recently discovered that the Orange River was known before Gordon reached it in 1777, and that in 1761–62 a well-equipped expedition penetrated into the interior of Namaqualand, much farther north than Paterson, Gordon, and other travellers did. In 1791–92 a second exploring party reached a point still further north. But these interesting journeys were soon afterwards forgotten. The British Museum contained the full diary (printed in Amsterdam, 1778) of the first of these expeditions, and as Mr. Theal had given only short reports, without going into geographical details, he had examined this diary and compared it with the literature of the present and the last century. He found that this old expedition was of considerable importance for our knowledge of South-West Africa. The object of the author in this paper, therefore, was to collect and criticise the new and old reports unknown to geographers and to give a correct account of the present state of the geography of South-West Africa.

Mrs. Bishop (Miss Isabella L. Bird) gave an account of her visit to the Bakhtiari country. Her route lay through Ispahan and up the country to Khur Amabad. Some people looked forward to the occupation of South-West Persia on the part of England at an early date, and those people considered that the Bakhtiaris, who were excellent horsemen, might soon be made use of by England in that occupation. In view of such an eventuality, interest was felt in the Bakhtiaris, their numbers, and their proximity to South-West Persia. She made references to a map, which described an area of 15,000 square miles in the 31 deg. to 34 deg. north latitude, and 48 deg. to 51 deg. east longitude. The distance she actually travelled was over 700 miles. She could not agree that the people of the Bakhtiari country were savages. In the first place they had that mark of true civilization, that both sexes were clothed in Manchester cottons. They showed reverence for old age and respect for infancy, which were not found in other savage tribes. In the four months she spent amongst them no one offered any personal rudeness. No man of the Bakhtiaris ever lifted the curtain of her tent. They were a pleasant people, and it was easy to move amongst them. The safety of the traveller in the Bakhtiari country depended upon his observance of Bakhtiarian custom and his not violating it where it was possible to avoid doing so. Her part of the expedition consisted of herself, an interpreter, a cook, and two muleteers. She rode on horseback, and they were obliged to take four mules owing to the necessity for carrying all provisions for 40 days, except meat. The party altogether numbered 18 men, of which two only were Europeans, with 20 mules and a few horses. With that party she travelled through that very wild country without any serious disaster. Travel was comparatively easy in the Bakhtiarian country proper, but on reaching beyond the outside range of the influence of two English officers who had preceded her in those parts the people were suspicious, and the party were fired upon twice by a number of tribesmen, but no one was injured. She started for Ispahan on April 30 last year, and the first stage of the journey was through a desert with 300 villages, each village an oasis, each oasis a paradise. On elevated plains, at an altitude of 6,000 ft., they found remains of Armenian villages and Armenian graveyards, showing that probably in centuries long past Christianity was professed by a far larger number of people in the country than at present. On her journey she experienced the cleverness of Bakhtiarian thieves and the celerity of Bakhtiarian justice. In a village she was robbed of all her money, being left absolutely penniless, but in a few days she was repaid the full amount by the local Cadi, who had levied it upon the village where the robbery took place. The thief was liable to have his right or left hand cut off, and the decision of which it should be was referred to her. She described the journey in search of the source of the Karun River. The sinuosities of the river were so extraordinary that in the country from its source to Shuster, a distance of 75 miles, the river's windings reached to 260 miles. In the same course it descended 900 ft. and received many tributaries, which increased its power and velocity In one place coal was found in abundance; it burned well, but there was much bituminous smoke. Bituminous limestone abounded, and bituminous springs. She heard of deposits of sulphur, with which the natives made their gunpowder, but she did not see them. The climate, though it had extremes, was very healthy. They found traces of well-built stone bridges and well-constructed roads, which must have been trodden by the soldiers of Alexander the Great and Valerian, though the natives attributed them and other similar works to supernatural agency in the mythical past. After an interesting account of the agriculture of the country, she said her chief interest was in the Bakhtiaris themselves, and a medicine chest she took with her, together with minor surgical operations, which she undertook, helped her materially in her observance of the native character and customs. Though as Moslems the Bakhtiaris despise women, women act as their doctors. The diseases of the natives were rheumatism, dyspepsia, headache, epilepsy, affections of the eyes, and a simple skin disease caused by want of personal cleanliness. Blood feuds were marked features. Polygamy is the custom of the country, and no female servants were allowed who were not also wives of the man of the house. A Bakhtiari man, therefore, married as many women as he could support, but the women were unveiled and had perfect freedom. However savage intertribal wars might be, the women were always safe. The author devoted some time to detailing the religious beliefs of the Bakhtiaris, which included the idea of a Supreme Being and an intercessor, Heaven and Hell, with a future probation beyond this life which might terminate happily, and a final judgment day. Sin they define as cowardice, breaches of the Seventh Commandment as offenses against tribal interests. They had some idea of the unity of God, but none of the fatherhood of God, the brotherhood of man.

Lord Aberdare moved a vote of thanks to Mrs. Bishop, and referred to the interest that had been taken in this people by Sir H. Layard.

Professor Max Müller seconded the motion, and remarked that this department had obtained a most valuable paper that properly belonged to anthropology.

Mrs. Bishop forgot in her interesting address, and neither Lord Aberdare nor Mr. Max Müller reminded her of the omission, to say which of his hands the Bakhtiari thief was condemned to lose by her decision. She is a great traveller, who has seen the cities and the ways of many men, and she has had the opportunity to observe that even the uncivilized have a respect for justice, when tempered with mercy. By the law of his people the thief deserved to lose his hand; and anthropology, if not geography, waits in suspense to know how the case was decided. Was the left hand cut off, or the right? A Bakhtiari has but two hands, and this must have complicated the question for a civilized woman, naturally reluctant to order the mutilation of a poor fellow to whom the brotherhood of man and the fatherhood of God were unknown ideas.

PILOT CHART FOR SEPTEMBER.--The U. S. Hydrographic Office had received, up to September 1, incomplete data respecting the hurricane of August 18, at Martinique. So far as known, the loss of life was 378, and property to the amount of $10,000,000 was destroyed. The storm passed WNW. toward Santo Domingo. Brief reports indicate that it recurved over the eastern Bahamas, and thence moved NE., close to Bermuda, where, at noon of the 27th, the wind blew with hurricane force from NNW., and the barometer fell to 29.44.

September is one of the most dangerous hurricane months, and the Pilot Chart calls attention to the following information:

"SEASON AND REGION.—Hurricanes are especially liable to be encountered from July to October, inclusive, in the tropics (north of the 10th parallel), the Gulf of Mexico, and Gulf Stream region. Earliest indications: Barometer above the normal, with cool, very clear, pleasant weather; a long, low, ocean swell from the direction of the distant storm; light, feathery cirrus clouds, radiating from a point on the horizon where a whitish arc indicates the bearing of the centre. Unmistakable signs: Falling barometer; halos about the sun and moon; increasing ocean swell; hot, moist weather, with light, variable winds; deep red and violet tints at dawn and sunset; a heavy, mountainous cloud bank on the distant horizon; barometer falling more rapidly, with passing rain squalls.

"CYCLONIC CIRCULATION.—One of the most important indications that an approaching storm is of hurricane violence is the marked cyclonic circulation of the wind, lower and upper clouds, etc. This may be easily appreciated by remembering that a cyclone of any great intensity is an ascending spiral whirl, with a rotary motion (in the Northern Hemisphere) against the hands of a watch, as shown on the diagrams. The surface wind, therefore, blows spirally inward (*not* circularly, except very near the centre); the next upper current (carrying the low scud and rain clouds), in almost an exact circle about the centre; the next higher current (the high cumulus) in an outward spiral—and so on, up to the highest cirrus clouds, which radiate directly outward. The angle of divergence between the successive currents is almost exactly two points of the compass. Ordinarily, with a surface wind from N., for instance, the low clouds come from N., also; on the edge of a hurricane, however, they come from NNE., *invariably*. In rear of a hurricane the wind blows more nearly inward; with a SE. wind, for instance, the centre will bear about W., the low clouds coming from SSE. (two points to the right of the wind). Great activity of movement of the upper clouds, while the storm is still distant, indicates that the hurricane is of great violence. If the cirrus plumes that radiate from the distant storm are faint and opalescent in tint, fading gradually behind a slowly thickening haze or veil, the approaching storm is an old one, of large area; if of snowy whiteness, projected against a clear blue sky, it is a young cyclone of small area but great intensity.

"INTENSIFIED TRADE-WIND BELT.—Another very important fact may be stated thus: When a hurricane is moving along the equatorial limits of a trade-wind region there is a belt of intensified trades to windward of its track; not until the barometer has fallen about six-tenths of an inch is it safe to assume that, because the trade-wind increases in force and remains steady in direction, you are on the track of the storm. By attempting too early to cross its track, running free as soon as the wind begins to freshen, you are liable to plunge directly into the vortex.

"THE BEARING OF THE CENTRE OF A HURRICANE.—The 8-point rule, it should be understood, gives only an approximate idea of the bearing of the centre, and it is probably less reliable in the dangerous than in the navigable semi-circle. The best general rule is that *the centre bears about eight points to the right of the direction from which the low clouds come*, or, what is practically the same thing, *eight points to the right of the wind at the moment of a sudden shift in a heavy squall;* after such a shift the wind will remain steady in direction for a time, but the centre is meanwhile moving along and the angle of bearing changes until the next shift, when it becomes eight points again."

LIGHT-HOUSES OF THE WORLD.—In a Report on the Modern Light-house Service, prepared by Mr. Arnold Burgess Johnson, Chief Clerk of the U. S. Light-House Board, appears the following statement, made up from the British Admiralty Lists, and collated to the year

1890 from statements then from one to five years old :

There were in Europe 3,309 lights, distributed as follows : Great Britain and Ireland 817, France 444, Sweden 295, Italy 244, Norway 220, Spain 187, Germany 179, Turkey 168, Netherlands 166, Russia 154, Denmark (6 in Iceland) 132, Black Sea (Russia and Turkey) 88, Portugal 29, Belgium 18.

Is it to be understood that the countries omitted, such as Austria-Hungary, Greece and Romania, were unprovided with lights in 1890? The figures foot up 3,141, instead of 3309.

There were 1,329 lights in North America :

The United States 802, Dominion of Canada 443, Newfoundland 51, Mexico 15, British Honduras 7, Costa Rica, Honduras and Salvador each 3, Nicaragua and Guatemala, each 1.

South America had 167 :

Brazil 65, Chile 21, Uruguay 16, Argentina 12, Colombia 10, Venezuela 10, Peru 10, Ecuador 9, British Guiana 6, French Guiana 5, Dutch Guiana 3.

The West Indies had 106 :

The Windward Islands 44, Cuba, 21, Leeward Islands 18, Bahama Islands 15, Curaçao, Buen Ayre and Oruba 6, Bermuda 2.

In Asia there were 476 :

China 81, Hindustan 78, Eastern Archipelago 75, Japan 67, Bay of Bengal 30, Straits of Malacca 29, Asiatic Turkey and Syria 28, Philippine Islands 26, Red Sea 15, Gulf of Tartary 14, Ceylon 10, Gulf of Aden 7 Gulf of Suez 7, Siam 2, Corea 1.

There were in Africa 219 lights :

Algeria 48, West and South Coasts 44, Egypt 26, East Coast 25, Canary Islands 13, Cape Verde Islands 12, Tunis 12, Morocco 6, Tripoli 5, Réunion 5, Azores 4, Mauritius 4, Madagascar 4, Zanzibar 4, Comoro Islands 3, Madeira 2, Seychelles 2.

In Oceania the number was 319:

Australia 203, New Zealand 79, Tasmania 12, Hawaiian Islands 8, Fiji Islands 8, Society Islands 3, Samoa and Friendly Islands 3, New Caledonia 2, and Caroline Islands 1.

The total number of lights for the world is 5,925; or, allowing for later additions, about 6,000.

TOPOGRAPHICAL ATLAS OF THE UNITED STATES.—Mr. J. H. Hickox announces in his *Catalogue of U. S. Government Publications, Vol. VII, Nos. 2–5*, that this indispensable periodical, created and sustained by his unaided efforts, will be continued. From this last issue is taken the following list of the Topographical Atlas sheets published during the past year:

UNITED STATES GEOLOGICAL SURVEY.

INTERIOR DEPARTMENT.

Note.—The Geological Survey publishes a map of the United States. (*See* below.) The Survey is also constructing an atlas of the United States from new surveys. Each State is divided by parallels and meridians into sections, and a sheet (about 14 by 17½ inches) covers either a square quarter degree or a sixteenth of a square degree. This division is made without regard to State or county boundaries. Thus it happens that one sheet will sometimes cover portions of two or even three States. A sheet is named from some prominent feature shown upon it. Most of them are on a scale of 1:62,500, or about one mile to one inch; or on a scale of 1:125,000, or about two miles to one inch. Those on the former scale cover 1-16 of a square degree; those on the latter, ¼ of a square degree. Relief is shown by contours. The contour interval varies from 5 to 100 feet, according to scale and character of country. The surveys already completed are: New Jersey, 50 sheets; Massachusetts, 54 sheets; Rhode Island, 15 sheets; Connecticut, 34 sheets. The following sheets have been completed during the year ended June 30, 1891:

ALABAMA.

ASHLAND. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 0′; longitude of eastern border 85° 30′.

CLANTON. Scale 1:125.000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 86° 30′.

ARKANSAS.

MAGAZINE, MT. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 0′; longitude of eastern border 93° 30′.

MARSHALL. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 30′; longitude of eastern border 92° 30′.

MARRILTON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 0′; longitude of eastern border 92° 30′.

MOUNT IDA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 34° 30′; longitude of eastern border 93° 30′.

MOUNTAIN VIEW. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 35° 30′; longitude of eastern border 92° 0′.

CALIFORNIA.

COLFAX. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 120° 30′.

PLACERVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 30′; longitude of eastern border 120° 30′.

COLORADO.

APISHAPA. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 37° 30′; longitude of eastern border 104° 0′.

AROYA. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 30′; longitude of eastern border 103° 0′.

CATLIN. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 0′; longitude of eastern border 103° 30′.

HIGBEE. Scale 1:125,000; contour interval 25 and 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 103° 0′.

LAS ANIMAS. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 0′; longitude of eastern border 103° 0′.

NEPESTA. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 0′; longitude of eastern border 104° 0′.

PUEBLO. Scale 1:125,000; contour interval 25, 50 and 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 104° 30′.

SANBORN. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 30′; longitude of eastern border 103° 30′.

SUFFOLK. Scale 1:125,000; contour interval 25 ft. Latitude of southern border 38° 30′; longitude of eastern border 104° 0′.

TIMPAS. Scale 1:125,000; contour interval 25 and 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 103° 30′.

CONNECTICUT.

BRIDGEPORT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 73° 0′.

DERBY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 73° 0′.

MERIDEN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 72° 45′.

NEW HAVEN. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 72° 45′.

NEW MILFORD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 73° 15′.

NORWALK. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 73° 15′.

WATERBURY. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 73° 0′.

GEORGIA.

ATLANTA. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 33° 30′; longitude of eastern border 84° 0′.

CARNESVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 34° 0′; longitude of eastern border 83° 0′.

GAINESVILLE. Scale 1:125,000; contour interval 100 ft.

Latitude of southern border 34° 0′; longitude of eastern border 83° 30′.

IDAHO.

CAMAS PRAIRIE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 43° 0′; longitude of eastern border 115° 0′.

MOUNTAIN HOME. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 43° 0′; longitude of eastern border 115° 30′.

ILLINOIS.

DESPLAINES. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 41° 65′; longitude of eastern border 87° 45′.

RIVERSIDE. Scale 1:62.500; contour interval 10 ft. Latitude of southern border 41° 30′; longitude of eastern border 87° 45′.

IOWA.

BALDWIN. Scale 1:62.500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 90° 45′.

CEDAR RAPIDS. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 91° 30′.

DAVENPORT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 90° 30′.

DE WITT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 90° 30′.

DURANT. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 90° 45′.

MAQUOKETA. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 90° 30′.

MONTICELLO. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 0′; longitude of eastern border 91° 0′.

TIPTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 91° 0′.

WHEATLAND. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 45′; longitude of eastern border 90° 45′.

WILTON JUNCTION. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 30′; longitude of eastern border 91° 0′.

KANSAS.

ANTHONY. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 0′; longitude of eastern border 98° 0′.

CALDWELL. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 0′; longitude of eastern border 97° 30′.

CHENEY. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 30′; longitude of eastern border 97° 30′.

GREAT BEND. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 38° 0′; longitude of eastern border 98° 30′.

HUTCHINSON. Scale 1:125,000; contour interval 20 ft.

Latitude of southern border 38° 0′; longitude of eastern border 97° 30′.

KINGMAN. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 30′; longitude of eastern border 98° 0′.

KINSLEY. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 30′; longitude of eastern border 99° 0′.

LARNED. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 38° 0′; longitude of eastern border 99° 0′.

LYONS. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 38° 0′; longitude of eastern border 98° 0′.

NESS CITY. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 38° 0′; longitude of eastern border 99° 30′.

PRATT. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 30′; longitude of eastern border 98° 30′.

SPEARVILLE. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 37° 30′; longitude of eastern border 99° 30′.

KENTUCKY.

HAZARD. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 83° 0′.

MANCHESTER. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 30′; longitude of eastern border 83° 30′.

SALYERSVILLE. Scale 1:125,000; contour interval 100 ft.

Latitude of southern border 37° 30′; longitude of eastern border 83° 0′.

MAINE.

BIDDEFORD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 15′; longitude of eastern border 70° 15′.

KENNEBEC. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 15′; longitude of eastern border 70° 30′.

NEWFIELD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 30′; longitude of eastern border 70° 45′.

PORTLAND. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 30′; longitude of eastern border 70° 15′.

MAINE AND NEW HAMPSHIRE.

DOVER. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 0′; longitude of eastern border 70° 45′.

YORK. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 0′; longitude of eastern border 70° 30′.

MONTANA.

LIVINGSTON. Scale 1:250,000; contour interval 200 ft. Latitude of southern border 45° 0′; longitude of eastern border 110° 0′.

NEVADA.

CARSON. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 39° 0′; longitude of eastern border 119° 30′.

NEW HAMPSHIRE AND VERMONT.

BRATTLEBORO. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 72° 30′.

NEW JERSEY.

BRIDGETON. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 15′; longitude of eastern border 75° 0′.

GLASSBORO. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 75° 0′.

EGG HARBOR. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 15′; longitude of eastern border 74° 30′.

HAMMONTON. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 74° 45′.

HIGH BRIDGE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 30′; longitude of eastern border 74° 45′.

MAURICE COVE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 0′; longitude of eastern border 75° 0′.

MULLICAS. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 74° 30′.

SALEM. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 30′; longitude of eastern border 75° 15′.

SOMERVILLE. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 40° 30′; longitude of eastern border 74° 30′.

TUCKAHOE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 15′; longitude of eastern border 74° 45′.

NEW JERSEY AND DELAWARE.

BAYSIDE. Scale 1:62,500; contour interval 10 ft. Latitude of southern border 39° 15′; longitude of eastern border 75° 15′.

NEW JERSEY AND PENNSYLVANIA.

BURLINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 0′; longitude of eastern border 74° 45′.

DELAWARE WATER GAP. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 75° 0′.

EASTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 30′; longitude of eastern border 75° 0′.

LAMBERTVILLE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 15′; longitude of eastern border 74° 45′.

PHILADELPHIA. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 39° 45′; longitude of eastern border 75° 0′.

WALLPACK. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 74° 45′.

NEW YORK.

BROOKLYN. Scale 1:62,500; contour interval 20 ft.

Latitude of southern border 40° 0′; longitude of eastern border 73° 45′.

NEW YORK AND CONNECTICUT.

STAMFORD. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 73° 30′.

NEW YORK AND NEW JERSEY.

GREENWOOD LAKE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 74° 15′.

HARLEM. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 73° 45′.

RAMAPO. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 0′; longitude of eastern border 74° 0′.

STATEN ISLAND. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 30′; longitude of eastern border 74° 0′.

NORTH CAROLINA.

WILKESBORO. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 36° 0′; longitude of eastern border 81° 0′.

PENNSYLVANIA.

CATAWISSA. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 45′; longitude of eastern border 76° 15′.

LEBANON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 40° 15′; longitude of eastern border 76° 15′.

SCRANTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 41° 15′; longitude of eastern border 75° 30′.

TEXAS.

ALBANY. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 99° 0′.

ANSON. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 99° 30′.

CLEBURNE. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 0′; longitude of eastern border 97° 0′.

DALLAS. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 32° 20′; longitude of eastern border 96° 20′.

FORT WORTH. Scale 1:125,000; contour interval 20 ft. Latitude of southern border 32° 30′; longitude of eastern border 97° 0′.

PALO PINTO. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 98° 0′.

WEATHERFORD. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 32° 30′; longitude of eastern border 97° 30′.

VERMONT.

WILMINGTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 72° 45′.

VIRGINIA.

FARMVILLE. Scale 1:125,000; contour interval 50 ft.

Latitude of southern border 37° 0′; longitude of eastern border 78° 0′.

PALMYRA. Scale 1:125,000; contour interval 50 ft. Latitude of southern border 37° 30′; longitude of eastern border 78° 0′.

ROANOKE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 79° 30′.

VIRGINIA AND WEST VIRGINIA.

DUBLIN. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 37° 0′; longitude of eastern border 80° 30′.

WEST VIRGINIA.

HUNTERSVILLE. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 80° 0′.

KANAWHA FALLS. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 81° 0′.

NICHOLAS. Scale 1:125,000; contour interval 100 ft. Latitude of southern border 38° 0′; longitude of eastern border 80° 30′.

WISCONSIN.

MADISON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 0′; longitude of eastern border 89° 15′.

STOUGHTON. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 42° 45′; longitude of eastern border 89° 0′.

SUN PRAIRIE. Scale 1:62,500; contour interval 20 ft. Latitude of southern border 43° 0′; longitude of eastern border 89° 0′.

UNITED STATES. Map of the United States, compiled under the direction of Henry Gannett, chief topographer, and Harry King, chief draughtsman. Scale 1:2,500,000, approximated, 40 miles to the inch. 1890.

——*Same.* Without contour lines.

PEARY'S GREENLAND EXPEDITION.—According to a despatch to the New York *Herald*, Mr. Peary's vessel, the *Kite*, arrived on the 15th of June at the Strait of Belle Isle, which was found to be packed with ice. The strait was cleared on the 20th, and on the 23d the coast of Greenland was sighted. The *Kite* reached Godhavn June 29th, and left it the same day for Upernivik and Whale Sound.

A later report to the *Herald* of August 24th is pervaded by a tone of discouragement, justified by nothing in the facts. Only the human alacrity in sinking can excuse the suggestion of a relief party next year. The conditions of the enterprise are precisely what they were, with the single exception of the accident which has disabled Mr. Peary for a short time; and accidents are not peculiar to Greenland.

A long article, published in the *Herald* of September 3d, reiterates with exaggeration the forebodings of the telegraphic despatch. Both documents, when read at a future time, may interest, if they do not please, the prophets of evil; and meanwhile Dr. Keeley, when he returns, should have something to say about his reported attempt to purchase an Eskimo child. The despatch follows:

ST. JOHNS, N. F., August 23, 1891.—The Arctic steamer *Kite* arrived here to-day with reports of interesting experiences in Greenland, which include a struggle of three weeks with bergs and floe ice in Melville Bay, during which period she made only 100 miles. Lieutenant Peary, his wife and five associates were landed in McCormick Bay, Murchison Sound. Whale Sound, his original destination, was frozen over and inaccessible by reason of ice islands and bergs.

While in Melville Bay Peary broke his leg below the knee and he was landed from the *Kite* on a stretcher. The accident occurred on July 11, about latitude 75 degrees, longitude 58 deg. 57 min.

The steamer had been jammed in about the same position for some time. In the evening of that day a strong breeze came up and the ice opened a little and the vessel commenced cutting her way through. The *Kite* came to a heavy bar of ice and the order was given to go astern and then charge the obstruction. Lieutenant Peary was behind the wheelhouse, unknown to the officer on the bridge. The rudder struck a large cake of ice and was knocked over to port. The wheel was sent flying out of the hands of the two helmsmen, the iron tiller hitting Lieutenant Peary on the right leg below the knee, breaking both bones.

It was a clean break, and everything looked favorable for a rapid recovery. He was carried below and a couch rigged up for him in the saloon. His private physician, Dr. Cook, decided that the occurrence need not interfere with the expedition, as he would probably be as well as ever in three months from the time of the accident.

ATTACKED BY A BEAR.

On July 16 the *Kite* was nearly lost. She got nipped between two floes, which began to come together rapidly. All hands were put to work, and by digging and blasting the vessel was saved from destruction. On the same night a polar bear attacked the ship and was killed at a range of fifty-nine yards, several shots out of the volley of thirty bullets having taken effect.

By a series of small stages Cape York was reached July 20. It seemed impossible to go further and it looked as if the expedition must be abandoned, as it appeared impracticable to land even there. On July 23, however, the ice suddenly opened and a course was made clear to McCormick Bay. The spot selected for the camp was on the south side of the bay, latitude 77 deg. 43 min., longitude 70 deg. 18 min., or about on a line with the most northerly point reached by the *Jeannette* expedition.

CAMPED AMID GLACIERS.

A house was built on the slope of a mountain eighteen hundred feet high, with the glaciers pouring down the hills in all directions. On July 30 the *Kite* bade the party farewell and steamed south. Lieutenant Peary wished to impress upon his friends in the United States that the accident to his leg was of small account. This fall the members of his party will explore the Humboldt Glacier—Mrs. Peary, perhaps, going along—and next April or May he and two others will go north to find the northern terminus of Greenland. Lieutenant Peary relies on his whaleboats to get back to Danish Greenland, a distance of six hundred miles, after the work is done next year. It is the unanimous opinion of the *Kite's* captain and officers and the Academy party that he cannot do this with his force, and that to attempt it would be folly. If, therefore, a relief expedition is not sent next year the outfit will be in a bad way.

An interesting study was made by the Academy party of Arctic highlanders of Ittiblu and Cape York. A native tent, two kayaks, or canoes, and weapons were secured for the World's Fair. This is undoubtedly the most complete collection ever made.

A GREAT TROPHY.

The real trophy of the entire expedition was secured on Disco Island in the shape of a three hundred pound meteorite. Three small fragments of meteorites were found there by Nordenskjold, in 1875, and the Swedish government fitted out a ship to bring them back. An American institution offered $10,000 for one, but this was declined. The German Government was to send an expedition next year to look for more. The German scientist Drygalski arrived in Disco just before the *Kite* arrived, but postponed the meteorite hunt until then. Two days after he left Greenland a professor named Heilprin made a trip to Ovifak in a native boat, and took all there were. They will be sent to the Philadelphia Academy. The only museums now possessing specimens are Stockholm and Copenhagen. Under the Danish treaties with Great Britain and the United States the entire expedition is technically a piratical one. The treaties say that any ship landing on Greenland without permission of the Danish government shall be confiscated and all on board punished. If the law were carried out all the scientists would have been sent in chains to Denmark, as Lieutenant Peary had neglected to go through the formalities. On this account he was refused guides, dogs and other assistants, both at Godhavn and Upernavik.

NEARLY LOST IN A STORM.

Besides the dangers of ice the *Kite* was nearly lost off Cape Parry in a terrific gale, the worst ever experienced by Captain Pike. There was also a dangerous combination of leeshore fog and icebergs. Ten days later the ship went ashore in Waigat Channel, between Disco Island and the mainland, but the tide was low and the water smooth, and she floated off.

Among the relics secured were a corpse of an Arctic Highlander, two years dead, and a fine assortment of Eskimo skulls. The entire party are in high spirits, though they had nothing but head winds since leaving New York. Valuable photographs were obtained, a team of young Eskimo dogs and sledges were secured. All explorations south of Godhavn on return journey were prevented by heavy weather and scarcity of coal. So much coal was used up in fighting the ice that Peary will possibly be left with only seven tons for winter. This will be barely sufficient for cooking and heating.

McCormick Bay is a gloomy spot at best, even with the sun high above the horizon twenty-four hours a day, as when the *Kite* was there. With the sun out of sight the high hills on all sides will make the prospect indeed dark and hideous. It seems fitted only for a winter home for bears and white whales, which abound.

Professor Heilprin found the altitude of the ice cap near the camp twenty-four hundred feet, and the party must take sledges and supplies up the glacier to this height before beginning the trip. If the party is detained on the ice cap a few weeks there will be a danger of starving, as no food can be secured after the start. The academy party certainly had their fill of Arctic experiences. Among the food they were forced to eat are bear's blood pudding, bear tongue, patty of bear heart, sandwiches of seal pie, sea gulls and many varieties of birds. Lieutenant Peary saved a bear carcass for winter use.

PREPARING TO RETREAT.

At one time during the Melville Bay experience it seemed certain that the ship would be detained in the ice all winter, as the water froze continually and cold weather seemed to have set in. There was no food on the vessel for any such period, and preparations were almost begun for a retreat over the ice when the floes broke up. The scientists lost greatly by the detention in Melville Bay. Captain Pike had warned Lieutenant Peary not to go into the bay so early, but the Lieutenant was bent on arriving at destination on the Fourth of July. Instead of that the day was celebrated with ice for a horizon all round. Berg climbing, seal hunting and snowballing were the sports. The scientists could have spent the time better in South Greenland, however, botanizing, and they chafed under the delay.

The Danish officials in Greenland consider the presence of Mrs. Peary on the expedition most unwise. It is possible that but for the accident to her husband she would have returned on the *Kite.*

In the latitude of Camp Peary the Arctic night begins at the end of October and lasts 113 days. The members of the party who are in the best condition after that will go North. Lieutenant Peary, if not relieved, will start home at the beginning of August, as he is not provisioned for a second winter.

There are many reindeer near the camp but the prospects for game are not very bright. Caches of blubber were found near the camp, showing the presence of natives in the neighborhood.

The Hydrographic Office chart of the coast north of Cape York was found very defective as to distances and bearings, and it was not possible to verify latitudes and longitudes, as the sun allowed of no observations during the sojourn of the *Kite.* In fact, no sights were possible during the last seven weeks of the trip.

RELIEF EXPEDITION PROBABLE.

The *Kite* left Godhavn homeward bound last Wednesday week. The Academy party will probably sail from here in the Allan line steamer for Baltimore next Wednesday. If these arrangements cannot be completed they will probably charter the *Kite* to take them to New York. The large quantity of material secured makes it advisable to get the *Kite* if terms can be made. There is a very strong probability that the Academy party will get up a relief expedition next year, as the opinion is general among them that some disaster is likely to happen if this is not done. Lieutenant Peary had no conception of the difficulty of crossing Melville Bay in whaleboats. Captain Pike says his boats are not suited for the journey as they are not strong enough to haul over the ice.

Dr. Keeley, the ship's surgeon, tried to buy an Eskimo child at Cape York, but though the natives were destitute and sadly in need of wood and weapons, they could not be prevailed on to sell one of their children. This settlement is said to be dying out. Only forty-eight Eskimos from three villages boarded the ship. Settlements not previously discovered were found on Saunders and Herbert islands, but the natives were away. Lieutenant Peary arranged with Professor Putnam, of the ethnological department of the World's Fair, to send home an Eskimo winter hut, but as it was made of stone and weighed twenty tons it was found impossible to put it on board the ship. A skin house was bought instead from the Ittiblu village.

September 15.

The foregoing was already in type, when a letter, dated July 27, was received from Mr. Peary, with the following report, to which is added a letter, published in the *Sun*, of September 6:

NORTH GREENLAND EXPEDITION OF 1891-92.

R. E. PEARY, U. S. NAVY.

McCORMICK BAY, GREENLAND, JULY 27, 1891.
Lat. 77° 40′ N. Long. 70° 40′ W.

A brief note of the voyage of the *Kite* with the North and West Greenland Expeditions on board may be of interest, but circumstances compel brevity.

The voyage has been exceptional in several respects.

In the first place heavy ice interspersed with small bergs was found filling the Straits of Belle Isle from end to end and extending in a solid pack sixteen miles to the east of Belle Isle. The strong current packed this so closely that the *Kite* was eighty-six hours forcing her way through.

From Belle Isle to Cape Desolation strong northwesterly winds were encountered rising finally to a gale with very rough sea.

Since sighting the Greenland coast, however, there has been no wind stronger than a light breeze from any direction, and with the exception of the time that the *Kite* was ice-bound in Melville Bay the weather has been uniformly clear, calm and warm, and the entire Greenland coast from Cape Desolation to Cape Walker, and from Cape York to Cape Saumarez, has been spread sharp and distinct before our eyes.

Not a cake or piece of ice was seen until the edge of the Melville Bay pack off the Devil's Thumb was reached.

The ice in Melville Bay, though it delayed us three weeks, was very rotten and rapidly melting away, but was yet too heavy for the *Kite* to steam through, and the entire absence of wind kept it stationary and opened no leads for us to take advantage of.

The ice had every appearance of not having been disturbed by any heavy weather during the entire season.

Once out of the pack and into the North Water off Conical Rock, a long swell from the north showed the existence of open water extending undoubtedly to Littleton Island or beyond.

The mouth of Whale Sound as far as the east end of Herbert Island is entirely open, but further up the ice is still undisturbed.

The weather has been delightful ever since we entered the Sound, and indications of the presence of natives in the shape of baited fox traps and caches of blubber have been found whenever a landing has been made.

The east side of McCormick Bay has been selected as the site of my house, the previously proposed site farther up the Sound being inaccessible on account of the ice. R. E. PEARY, U. S. N.

North Greenland Expedition of 1891–92.
McCormick Bay, Greenland, July 26.
Lat. 77° 40′ N. Long. 70° 40′ W.

At last the *Kite* has reached her haven, and after forty-eight days of battling with Arctic seas and ice packs, lies moored within the midnight shadow of the snow-capped cliffs that line the northern shore of Whale Sound. Our latitude is 26′ great than that of the *Jeannette* when crushed. For eight years no ship has wakened the echoes of these cliffs with her whistle; in fact, no ship ever penetrated as far into the Sound as this. Baffin anchored somewhere within the sound on July 4, 1616, and Hayes, while on his homeward voyage in 1861, leaving his schooner outside, came in in a boat and took a round of angles and named prominent points and indentations.

It is with feelings of eagerness and impatience that the eyes of the North Greenland expedition scan the wild shore and the surroundings of what is to be our home for the next year.

The northward voyage of the *Kite* has been exceptional in several respects, some favorable, some the reverse. Leaving New York on the 6th of June, the voyage to Sydney was made in five days. Stopping here one day to coal we got under way again on the 12th (Friday), for the Straits of Belle Isle. On Monday morning in thick fog we ran into heavy pack ice extending entirely across the southwest entrance to the Straits, and did not get through the Straits and into open water east of Belle Isle until 4.30 o'clock Friday afternoon.

The occurrence of heavy Arctic ice in the Straits of Belle Isle, choking it from end to end and extending unbroken a distance of sixteen miles to the eastward of Belle Isle, was unprecedented for this time of the year.

Once clear of the Straits we encountered the kind of weather to be expected at this time in the North Atlantic, *i. e.*, what the sailors call "dirty," until Cape Desolation off the Greenland coast was sighted at midnight of the 23d.

Then there was a complete change, and from here to Godhavn, which was reached early in the forenoon of the 27th, we enjoyed such an uninterrupted view of the wild, majestic scenery of the Greenland coast, such a continuation of calm seas and clear sunshine, and such an utter absence of ice as has probably been experienced by no other Arctic expedition. No pack ice whatever was seen, only the fleets of stately icebergs which always guard these Greenland coasts.

At Godhavn just such a perfect day smiled on us as greeted me five years ago; the great red brown cliffs across the harbor seemed like old friends, icebergs glistened in the brilliant sunlight, and snowbuntings hopped and twittered over the rocks.

The place itself, it is hardly necessary to say, had not changed. No building boom has reached here yet, and the real estate market is as flat as ever. Inspector Andersen's family is a little larger than it was five years ago and Gov. Jansen's ditto, but the inspector and Mrs. Andersen are the same genial, hospitable, homelike couple as ever.

Frederick, my former guide and interpreter, was as ugly as to his face and broken as to his English as ever, and Broberg, the pilot, had not changed a hair; Ikkias and fat Jacob of my old crew were still as ever, but the belles of the town were married, and Hans Hendrick, the Eskimo, who had accompanied so many expeditions, has been dead for three years.

After the formality of a call on Inspector Andersen, accompanied by Prof. Heilprin, Dr. Sharp, and Mrs. Peary, the freedom of the place was given to the expeditions and the members immediately started out for a field day.

All the members of the north Greenland party, accompanied by Profs. Heilprin and half of the west Greenland section, started for the ice cap peering down from the summit of the island through the gorge opposite the settlement. First over the rocks surrounding the harbor, then through the moss-covered, flower-strewn valley, up steep mossy slopes, over the crumbling talus of débris from the cliffs, through a steep defile, then up a slope barren as an ash heap, except for the presence of yellow poppies. It took us four hours of an Arctic afternoon to reach the edge of the ice cap, 2,400 above the sea.

Glowing with our experience, we felt no need of the extra wraps we had brought along, but used them for cushions, and seating ourselves enjoyed the scene around and below us—scenery that can be duplicated nowhere but in Greenland.

Almost at our feet, framed by the walls of the gorge through which we had ascended, lay the town and harbor of Godhavn (the houses mere specks), and the *Kite* and Danish brig in the harbor—toy boats.

Beyond the town the soft blue of Disco Bay rose, dotted with icebergs, far distant misty Egedesminde and the Crown Prince Islands. To our right over the ice cap the blue of Baffin's Bay climbed upward till lost in the golden splendor beneath the western sun. Over the ice cap to our left, Disco Bay, expanding to the Jacobshavn Mountains, bore upon its placid bosom hundreds of icebergs, the output of the mighty Jacobshavn Glacier, whose gleaming front was visible breaking the dark round of the mountains. Behind us was the eternal, unbroken, serene ice cap, smooth as marble, undulating gently.

After the party had feasted upon the scene, all turned to build a cairn in memory of the visit of the Greenland expeditions. When completed to a height of about eight feet on an outcrop of the ledge, the date, the names of the party, and a few American coins were put in a little tin box and deposited in the cairn. Then the party returned to the *Kite*, tired and hungry, but enthusiastic over their Greenland field day.

The next day, though Sunday, was devoted to excursions to points of interest in the neighborhood of Godhavn. In the evening, accompanied by Professor Heilprin, Mr. Astrup, Mr. Kenealy and Mrs. Peary. I dined with Inspector Andersen and Governor Carstens and their families at the Inspector's. After the dinner we looked on for a little time at a native dance in one of the Government buildings, and then returned to the Inspector's house to pass a pleasant evening, with coffee, hot toddy, and the examination of Inspector Andersen's valuable collection of minerals and eggs.

As we made our adieus and took the narrow but well-beaten path down to the little landing where the boat lay waiting to carry us out to the *Kite*, the great brown cliffs rose high into the yellow radiance of the northern sky, casting the little settlement in shadow, but beyond the harbor the icebergs glowed in the yellow sunlight.

On Monday morning I had intended to get under way early, but a southwester, accompanied by a very dense fog, held us in the harbor until 2 P. M., when we steamed out with flags dipping and a salute from the ship's cannon and all the small arms on board.

Once out of the harbor and through a large fleet of bergs cruising off the entrance we shaped our course north and went along the shore of Disco Island, and thirty-six hours later cast anchor in the harbor of Upernavik. During all these hours we steamed through a sea on which hardly a ripple could be seen, dotted here and there with bergs, but absolutely clear of ice, past a continually sunlit coast the Waigat, Noursoak Peninsula, broad-mouthed Omenak Fiord, with the great inland ice visible far up at its head. Black Hook of the Old Dutch navigators, and sublime Sanderson's Hope all stood out in their grandest, most brilliant aspect.

Governor Beyer, of Upernavik, was found to be a very different man from genial Inspector Andersen, and finding it impossible to obtain either a kayak or a native interpreter to go along with us, I returned his official call, accompanied by Professor Heilprin and Mrs. Peary, and then got under way as soon as the fog lifted.

Still our charming weather kept with us, and all night long, after leaving the most northerly town on the globe, with bow turned northward, the *Kite* steamed over summer seas, past the numerous red-brown islands that guard this Arctic coast. Through every depression in the mountains, and from every fiord head, the marble surface of the inland ice looked down upon us, the crevasses in its lower portions, visible at times with the naked eye, past many giant milestones by which the whalers measure their advance in their yearly battles with the ice-floes, we steamed without seeing a bit of ice, and at 6 in the morning reached the Duck Islands, a well-known rendezvous and lookout for the whalers while waiting for the ice barriers of Melville Bay to open for them.

At these islands we stopped till afternoon, laying in a supply of eider ducks, which breed here in thousands. Unfortunately we were too late to get eggs, all being too far advanced to be edible.

Leaving the islands our course was shaped direct for Cape York, with the most sanguine expectations of making a speedy passage across Melville Bay, and perhaps reaching Whale Sound on the 4th of July, the day on which old Baffin cast anchor in the Sound 275 years ago. Our expectations, however, were destined to a speedy downfall. Sixteen miles north of the Dutch Islands we encountered the dreaded Melville Bay pack, and, after running along its edge close into the Devil's Thumb and then back again to the westward in search of a good opening the *Kite*, at 7.30 P. M., on July 2, stuck her sturdy little nose into the pack and began her long battle. Three weeks later, on the morning of the 23d, she emerged from the ice off Conical Rock. Annoying and dull as these three weeks would be under any circumstances, two of them have been especially so to me, laid up on my back with a broken leg.

The accident was caused by a large cake of ice coming in contact with the *Kite's* rudder, while she was going astern, the shock tearing the wheel from the hands of the men stationed at it, and driving the iron tiller against my leg with sufficient force to snap the bone above the ankle.

Though a simple fracture that has already begun to knit, and scarcely more serious than the loss of a finger, the accident has been a severe strain upon my patience.

It will naturally affect the amount of work that I can do this season, as it will confine me for some weeks longer, but it will not interfere with the long sledge journey of next spring.

Once free of the ice and into the north water the *Kite* came merrily along past Wolstenholme Island and Sound, and rounded Cape Parry into Whale Sound.

At Barden Bay we stopped at an Eskimo settlement with a population of seven adults and five children, and obtained some silver, ivory, etc. Then we steamed to Herbert Island, but found no natives, and then shaped a course up the Sound for the proposed site of the house near Cape Tyrconnel.

Our progress was soon stopped, however, by the ice extending unbroken from the east end of Herbert Island to Cape Powlet. Coming about, the *Kite* steamed up between Northumberland Island and Herbert Island, and attempted to get to the eastward through Murchison Sound, north of Herbert Island. Again the ice extending from the east end of Herbert Island to the north end of the Sound barred our advance, and finding it impossible to get further up the Sound, the winter ice not yet having come out, the *Kite* was run into McCormick Bay, and after a reconnoissance of both shores my house will be built on the east side, with an outlook to the southwest, and front Northumberland and Hakluyt Islands.

The site of the house is bright with flowers, and there are numerous traces of reindeer, foxes and hares. Seals and walrus are abundant in the water. Traces of natives are more numerous than I had anticipated. Although we have found but one inhabited village, others visited are evidently only temporarily deserted, and wherever a landing has been made baited fox traps and caches of meat and blubber have been found. All indications are that the expedition will not suffer for provisions.

R. E. PEARY.

THE FLEMISH FOUNDERS OF NEW YORK.—Mr. Virlet d'Aoust's letter on the foundation of New York in 1623 by a colony of Walloons and Flemings is printed in the *Compte Rendu* of the Paris Société de Géographie, No. 12, 1891.

It tells the well-known story of Jesse de Forest, who sailed from the Texel in the ship *New Netherland*, in March, 1623, with a company of emigrants, to whom the States-General had given permission to settle in the Dutch possession of New Netherland in America.

This settlement, which occurred in May, 1623, Mr. Virlet d'Aoust chooses to consider as the foundation of the city, *wrongly called* at first New Amsterdam, instead of New Avesnes, and since known by the "glorious name" of New York. He has reconstituted the history of Jesse de Forest from the study of printed documents, with which other scholars have been acquainted for years, and also from information furnished by members of the de Forest family; and he closes his note with the following flight of imagination:

"Rome, Ancient Rome, raised her founders, Remus and Romulus, to the rank of the gods. The modern American Rome will undoubtedly scorn to remain below the level of her predecessor, and the municipal administration of New York will some day think of raising a monument to the memory of the Avesnois Fleming, Jesse de Forest, the city's first founder, who sacrificed to her his great fortune and his life."

To men less deeply stirred in mind than Mr. Virlet d'Aoust New York resembles Rome as Monmouth does Macedon, and there are difficulties in the way of the proposed monument. It would overtax the resources of art to represent Jesse de Forest as the twins, Romulus and Remus. Romulus, in any case, he could not be, for he fell a sacrifice to the great city; and, for the other, no eloquence could move the Board of Aldermen to vote an appropriation for a statue of Uncle Remus.

LABRADOR.—The Bowdoin College expedition, which entered Labrador in the month of July, returned to the coast, on the 1st of September, having accomplished the principal object, the discovery of the Falls of the Grand or Hamilton river. Mr. Randle F. Holme, who journeyed in Labrador from July to October, 1887, but failed to reach the Falls, describes them from report and knowledge of the country as probably the most stupendous falls in the world, though it is rash to use superlatives in such cases. Mr. Holme's reasoning is good. He says (*Proceedings*, Royal Geographical Society, 1888, pp. 197–198):

"The centre of Labrador, as is generally known, is a vast tableland, the limits of which are clearly defined, though of course the country intervening between this limit and the coast always consists, more or less, of a slope. Roughly speaking, it may be said that in the south and north there is a more or less gradual slope from the height of land to the coast, while in the south-east the descent is sudden, and almost immediately after leaving the tableland there is reached a level which is but little above that of the sea. . . . On the height of land there is found a succession of great lakes joined together by broad placid streams. When the streams of water reach the edge of the tableland, they of course commence a wild career down towards the sea. In the case of the Grand River this rapid descent begins with the Grand Falls, and almost the whole of the great drop to the sea-level is effected in the one waterfall. The elevation of the Labrador tableland is given by Prof. Hind as 2,240 feet. . . . But in the Grand River below Lake Waminikapou there is only one fall, viz., that which occurs 25 miles from the river-mouth. This fall is 70 feet. . . . Now the lake first above the Grand Falls is on the height of land. . . . It follows, assuming the elevation of the tableland on the east to be approximate to that on the south, that in the 30 miles beginning with the Grand Falls and ending with Lake Waminikapou, there is a drop of about 2,000 feet."

According to a telegram dated September 11, from Port Hawkesbury, Cape Breton, the discovery was made by two of the Bowdoin College party, Messrs.

Cary and Cole, who reached the Falls on the 13th of August. They were provided with instruments for measuring heights and distances, and it is implied in the following extract that these were put to good use:

"As they neared the falls a truly magnificent sight was spread out before them. The spray, which was visible 20 miles, rose in a cloud, and the solid rock beneath their feet trembled perceptibly.

"From the falls the water flows through a cañon formed of archæan rock, the sides of which rise to a height of 500 feet. Through this cañon water flows with terrific force, making it absolutely impossible for any boat to live.

"The height of the falls has been grossly exaggerated, and, while presenting a grand and beautiful sight, measures only 200 feet in a perpendicular fall, the rapids leading to this fall increasing the total altitude of the falls to 500 feet.

"Above the falls the average width of the river is 500 yards, narrowing until it reaches the falls to a width of only fifty yards, when it plunges with a terrific roar over the edge and falls into the narrow gorge below. Mr. Cole descended to the foot of the falls and succeeded in obtaining some good photographs of them.

"Having completed the observations of the falls, the party went on a few miles above to the Height of Land, where, from a peak christened by them "Mount Hyde-Bowdoin," they had a fine prospect of the surrounding country. The plateau is nearly all wooded, with a thick, though not, large, growth of soft timber."

It is not to be doubted that two officers of the Hudson Bay Company had visited the Falls; one Mr. Ma-clean, who was stopped by them in 1839, and the other, Mr. Kennedy, who some thirty years ago was in charge of Fort Nascopee on Lake Petchikapou. Mr. Holme says (*Proceedings*, R. G. S., 1888, p. 197) that he got considerable information from Mr. Kennedy's guide to the Falls, an Indian named Louis, now a cripple.

Messrs. Cary and Cole are none the less entitled to the honor of the discovery.

ROBERVAL'S FORT.—A note in Sweetser's *Hand-Book of the Maritime Provinces, Boston and New York, 1890, p. 301*, suggests the possibility of light on a mystery of early Canadian exploration. This note says:

"Mr. Price, M. P., states that a missionary has recently discovered, high upon the Saguenay (or on the Mistassini) an ancient French fort, with intrenchments and stockades. On the inside were two cannons, and several broken tombstones dating from the early part of the 16th century. It is surmised that these remote memorials mark the last resting-place of the Sieur Roberval, Governor-General of Canada, who (it is supposed) sailed up the Saguenay in 1543, and was never heard from afterwards."

Like all the professed discoveries of Roberval's Fort, this also resolves itself into surmise and supposition. Mr. E. E. Taché, Assistant-Commissioner of Crown Lands for the Province of Quebec, says in a recent letter to Mr. F. A. Stout, of this Society:

"At last I am in a position to give you some kind of an answer to your various enquiries relating to the old forts on the Mistassini. As promised, the matter was referred to the Honorable Mr. Price, who directed one of his superintendents to look into it. Herewith enclosed, I transmit you copy of Mr. Stinton's letter bearing on the subject and which, to some extent, corroborates my statements."

The enclosed letter reads:

"CHICOUTIMI, APRIL 13, 1891.

"*Dear Mr. Colston:*

"I think the supposed Fort on the River Mistassini is a myth, as I have seen all who ought to know and have had H. B. Co. records for years back overhauled.

"All places of trade in this section of the Fur Country were and are called forts, so every H. B. C. post is called a fort, even if only a log house, all Price's first establishments, especially at Chicoutimi and Sault au Cochon, in old times were called forts; the same for missionary establishments, and the Jesuits had, before our occupation, such a fort on the mouth of the Mistassini. About a century ago they abandoned it and went to Pointe Bleue; fifty years later they abandoned Pointe Bleue and went to Metabetchouan, and then abandoned that place, and are now replaced by the Pères Oblats.

"Malcolm Dechene, one of McLeod's voyageurs, now 94, says, when he was young the ruins of this Jesuit fort at Mistassini existed. He has seen them and thinks there was a graveyard, but certainly no inscriptions, and as regards cannon, 'none.' He says, however, very large swivel arquebusses have been found there, clumsy, bell-mouthed pieces, fired with a match instead of a lock; and I have myself seen one of these pieces, found near my house at Chicoutimi. It was about two inches bore and about double that at the mouth. . . .

"Believe me, yours very faithfully, A. STINTON."

THE GEOGRAPHICAL SOCIETY OF THE PACIFIC.—This Society, which was organized at San Francisco in March, 1881, has just issued the first number of Vol. II, of its *Transactions and Proceedings.* Its activity is, however, far greater than the statement of this fact implies.

The Secretary gives a list of 127 papers read at the meetings, up to June, 1891; a record that might be left to stand by its own merit, without the questionable addition that, "During the last ten years more papers have been read before the Geographical Society of the Pacific than before any other Geographical Society in the World, excepting the Royal Geographical Society of Great Britain and Ireland."

It ought to be known that the Royal Geographical Society is not of "Great Britain and Ireland," but of "London"; and it is enough to turn over the *Verhandlungen* of the Berlin Gesellschaft für Erdkunde to dispose of the claim made for the San Francisco Society.

The present number of the *Transactions and Proceedings* contains three papers: Humboldt Bay, by Prof. George Davidson; Geographical and Ethnographical Notes on Alaska, by Ivan Petroff; and Corea, the Hermit Kingdom, by John T. Scott.

Prof. Davidson, who knows the Pacific Coast as a pilot knows his harbor, finds that "Cabrillo and Ferrelo failed to see the land as far north as Cape Mendocino; that Drake merely indicated a receding shore north of Mendocino; that Vizcaíno, or his second in command, placed a 'Great Bay' just north of Cape Mendocino, without the peculiar land-locked characteristics of the present Bay; that Bodega, who surveyed Trinidad Bay in 1775, and who there discovered the peculiar type of our tides, and who had much intercourse with the natives, failed to see or learn of its existence; that Vancouver twice passed it by without a sign of recognition; and that it was left to the American, Captain Jonathan Winship, in an American vessel, with an American crew, to discover the Bay in 1806, when temporarily in the service of the Russian American Company."

From this time Humboldt Bay remained practically unknown until 1849, when a party under Dr. Josiah Gregg came to it by land. The next year the channel was discovered by Capt. H. Bulme, then second officer of the U. S. Rev.-Mar. schooner *Laura Virginia.* The Bay then received its name. Five maps illustrate the paper.

Mr. Petroff gives the result of his observations among the Eskimo and Athabaskan families of Alaska, the former inhabiting the shores from the Copper River westward and northward and from Bering Strait easterly on the Arctic coast, and the latter being sparsely distributed throughout the interior, with one opening to the sea in Cook Inlet.

These two families are in contact along the banks of the Nushagak, the Kuskokwim and the Yukon rivers. On the Nushagak the Eskimo have given up the characteristic *Kayak.* Their houses are the most miserable Mr. Petroff has seen in Alaska. They are built underground, are lined with logs and covered with sods laid on a framework of poplar poles.

The Athabaskans, living on the Malchatna River which enters the Nushagak from the east, about 200 miles from tide water, live in log houses during the winter, but lead a roaming life during the summer. Fifty or sixty miles from the mouth of the Malchatna is a portage route between the Nushagak and the Kuskokwim, not more than 30 miles across but through a swampy country, the water-shed which divides the rivers being only a thousand feet above the sea. Beyond the portage was the first Athabaskan settlement, but the sickness of his men forced Mr. Petroff to leave this unvisited and to return to the Nushagak. There he took the steamer along the coast to the Hagemeister Islands. The Eskimo came off in *kayaks* to beg for tobacco. They were almost without fire-arms, their weapons being spears and arrows.

The Kuskokwim was entered from the sea. The Eskimo frequent the lower river to hunt the grampus, which is left there stranded by the retreating tide. Rows of *beluga*, or white whale, skulls, which looked almost human, were arranged from the line of high-water up to the central ridge of the shore. The natives, when asked to explain this arrangement, answered that the hunters deposited the skulls of the animals killed in a continuous row; which seems to mean that the skulls were so arranged because they were put in that way, though it leaves us in the dark as to what becomes of the skulls of the animals that are not killed.

At this point of the river the opposite shore is never in sight, but at the lowest stage of the ebb tide the waters recede so that they cannot be seen from the shore.

The Kuskokwim Eskimo live in underground houses, with their dogs. They drink, when they are thirsty, any kind of water, even the "briny fluid," when they are at sea.

Shevenagamute, the first trading post on the river, showed evidences of civilization, in the display of cotton goods and matches and the use of cooked food. The rate of exchange at this place was one needle for two salmon, two needles for a goose or a brace of ducks, and a fine-toothed comb for a dozen fish, or three or four ducks.

Twenty miles above this place the two banks of the river were visible at the same time, and villages were met with every ten or fifteen miles, each settlement containing one or two hundred persons.

At 100 miles from the sea the birch-bark canoe appeared, the river banks were higher, and the trees furnished building material for houses. At the Moravian Mission of Bethel there is a school, and some of the natives have learned to count in English up to thirty. Fire-arms are to be found in every habitation, and the reindeer have almost disappeared.

The limit of the Eskimo on this river is Kaltkhagmute. Here is an ancient burial place with carved monuments, mostly in human shape, with disk-like heads and grotesque features. Some of these figures are partially clad, and many have four and even six arms branching off ; a few of these holding wooden platters, on which offerings of tobacco and mink-skins are placed.

From this point the Yukon was reached by a four days' portage and two days on a tributary stream. Where this entered the Yukon is the Russian Mission of Ekogmute. The dwellings here are all above ground and are built of logs, and have roofs covered with earth. The mission is sixty years old, but does not seem to have modified the native ways of life.

On the river the people were engaged in catching the king salmon. The women and girls do the work of cleaning and drying the fish.

At Kozérevsky is a Jesuit Mission established two years ago, and three Sisters of St. Anne have made astonishing progress in teaching the children of the natives. There were twenty-four of these children, all speaking and reading English. They performed a play, written for them, and one presented a little paper to Mr. Petroff with these words written on it: "My name is Joseph and I am seven years old."

The boys are taught gardening, wood-carving, building, etc., and the girls make moccasins and shoes and other articles. One of the Sisters is a professional lace-maker from Belgium, and she has introduced the art.

These Ingaliks make pottery, not of a durable kind, but, as Mr. Petroff believes, the only native Alaskan pottery.

The attempt to introduce Siberian reindeer would fail, Mr. Petroff thinks, because the Alaskan Eskimo is a hunter, to whom an animal is only so much meat, and it would take generations to develop the habits of pastoral life. The Eskimo dogs, moreover, would exterminate the reindeer, if left to themselves.*

Mr. Scott makes no pretension to a close acquaintance with Corea. He visited the country in 1889, under contract as a mining engineer, and left it in two or three months.

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* Mr. Petroff was the special agent of the U. S. Census Bureau and his report, soon to be published, shows that the natives in Alaska are dying out. They number 8,000 less than they did ten years ago. There has been a large influx of whites and Chinese, but there is a decrease of 2,000 in the population of the Territory. The total population to-day is computed at 31,000, composed of 900 Aleuts, 5,000 Indians, 18,000 Esquimaux, 2,300 Chinese and 4,800 whites. In 1880 the number was 33.000, and since that time some 4,000 whites and 2,000 Chinese have been added. Mr. Petroff says rum has ruined the natives.

Alaska.—The *Bulletin* of the National Geographic Society, Vol. III., pp. 53–204, is devoted to Mr. Israel C. Russell's report of his exploration of Mount St. Elias, in 1890. Twenty pages are taken up with a survey of previous work in the same region and the narrative begins at p. 75.

The expedition was organized under the joint auspices of the National Geographic Society and the United States Geological Survey, but was greatly assisted by individuals; and the credit for securing the necessary funds belongs to Mr. Willard D. Johnson. The report shows that all the members of the party worked with interest and enthusiasm, and Mr. Russell himself seems to have been strongly impressed by the magnificence of the scenery in the neighborhood of the St. Elias range.

Of the results he says: "The work planned at the start was carried out almost to the letter, with the exception that snowstorms and the lateness of the season did not permit us to reach the summit of Mount St. Elias."

He determines three well-defined formations in the region:

1. The sandstones and shales about Yakutat Bay and westward along the foot of the mountain to Icy Bay. This is named the *Yakutat system.*

2 A system of probably later date, composed of shale, conglomerate, limestone, sandstone, etc., best exposed in the cliffs of Pinnacle pass and along the northern and western borders of the Samovar hills, and named the *Pinnacle system.*

3. The metamorphic rocks of the main St. Elias range. These are called the *St. Elias schist.*

There are two groups of glaciers, the *Alpine*, of the Swiss type, and the *Piedmont glaciers*, by which name Mr. Russell designates the plateaux of ice along the ocean. This type is represented by the Malaspina glacier, which has an area of between 500 and 600 square miles and a surface elevation in the central part of between 1,500 and 1,600 feet.

With regard to the height and position of Mount St. Elias, Mr. Russell says: "It was intended that Mr. Kerr's report, forming Appendix B, should contain a detailed record of the triangulation executed last summer, but a careful revision of his work by a committee of the National Geographic Society led to the conclusion that the results were not of sufficient accuracy to set at rest the questions raised by the discrepancies in earlier measurements of the height of Mount St. Elias." . . .

The *Bulletin* is illustrated by a number of well executed plates.

MR. SETON-KARR'S MAP OF THE CHILCAT COUNTRY.—Dr. Aurel Krause contributes the following note to the *Deutsche Geographische Blätter*, *Band XIV*, *Heft* 2.

"The statement, which I made in the last number of this journal concerning the travels of Seton-Karr in Southern Alaska, has called forth an answer in the May number of the *Proceedings* (Royal Geographical Society), in which it is affirmed that Mr. Seton-Karr copied his map, not directly from that of my brother, but from Dawson's map (1888). On Dawson's map, however, not only is it expressly mentioned that the drawing of the Chilkat River and the pass leading from it to the Yukon is taken from my brother's map; his route is also laid down as a dotted line along the Wellesley—(Tlehini)—river, discovered (!) by Mr. Seton-Karr, to the Heywood Pass, discovered (!) by Mr. Seton-Karr, and beyond that northwards to the confluence of the Yukon.

"For the rest, I refer to my first communication, from which I have not a word to take back."

BERLIN, MAY 12, 1891.

Mr. Seton-Karr says, in the *Proceedings*, R. G. S., for February, p. 76:

"From Klokwan I followed the Chilcat River upwards to its junction with a large stream, which I named the Wellesley River. I found afterwards that it had an Indian name—Klaheena."

When he has occasion to mention this river in subsequent pages, he calls it sometimes Wellesley, sometimes Klaheena; and in his letter, published in the BULLETIN of this Society for June, he disavows the intention of claiming the discovery of the river.

Of Heywood Pass (so named on his map) he says in *Proceedings*, R. G. S., February, p. 83:

"The other two . . . . succeeded in reaching, in company with some Indians who were going in that direction, a branch of the Altsehk other than that which leads from the more direct pass, which I may claim to have discovered."

NAVASA ISLAND.—This island, variously called *Navassa*, *Navaza* and *Navaze*, lies in the southern part of the Windward Channel, between Haiti and Jamaica. It is described in Publication No. 63 of the U. S. Hydrographic Office, as follows:

"Navassa island is 2 miles long NE. and SW. and 1 mile wide; it lies W. ¾ N. from Cape Tiburon, 28 miles distant, and has a uniform height of about 300 feet. Its surface is nearly level, with steep, sloping sides, terminating all round in bold perpendicular white cliffs about 20 feet high.

"The island is inaccessible, excepting at the landing platform on NW. side of the island, used for the shipment of guano.

"The island is of volcanic origin, composed of limestone interspersed with veins of sharp honeycombed rocks of iron pyrites. The spaces between the rocks are filled up with guano, which in some places is 14 feet deep.

"With the exception of the NW. extreme, which is a prominent bluff, a narrow ridge, about 15 feet high above the cliffs and a cable broad, extends all around the island. The summit is clothed with stunted palm-trees and cactus, and is inhabited by iguanas and numerous flocks of sea-birds.

"The island is surrounded by a bank of soundings from ⅓ to ¾ of a mile broad. On the N. and E. sides the bottom is rocky, and the depth from 18 to 40 fathoms. On the W. side the bottom is fine sand with small shells, and anchorage will be found sheltered from the usual trade winds in 16 fathoms of water, good holding ground, with the NW. bluff bearing N. or N. by E., and the SE. point ESE. about ½ a mile off shore; but a heavy swell sets round the SE. end of the island, and the current generally to the NW. The wind seldom blows from the westward. From the NW. end of the island a coral ledge with 4½ fathoms of water on it extends a cable off.

"The NW. point is assumed to be in lat. 18° 25′ 10″ N., lon. 75° 2′ W."

This description seems to show that Navasa Island is not the best place in the West Indies for a naval station.

OROZCO Y BERRA.—The latest *Boletin* of the Mexican Geographical and Statistical Society (4ta Epoca, Tomo II, Nums. 1 y 2) has an account of the Memorial Session of the Society, held on the 31st of December 1889, in honor of Manuel Orozco y Berra. At this session the chair was occupied by President Diaz, and all the proceedings testified to the sense of the national loss in the death of a man, no less remarkable for the solidity and simplicity of his character than for his learning and his unwearied industry. A scholar and a man of science, he wrote on many subjects, but his attention was chiefly given to the history and the geography of Mexico. He had filled many positions of responsibility and of dignity as Professor of Mathematics, of Geography and History, of Mexican History, as Minister of Public Works, as Director of the National Archives and Director of the Museum, and as Member of the Supreme Court; but he never sacrificed to Fortune, and he died in poverty and forgotten, though not without leaving behind him, in the words of the *Comision de Publicaciones*, "a most precious treasure, his works to his fatherland and to his family his unstained integrity."

THE LIMA GEOGRAPHICAL SOCIETY.—The *Sociedad*

Geográfica de Lima was founded by decree of February 22, 1888; but its effective organization dates from April 15, 1891, when its "official life" began with the publication of its first *Boletín*.

The Society forms a public office under the Ministry of Foreign Relations, and its existence is assured by an appropriation from the Treasury.

The *Boletín*, which contains 40 pages, is published monthly, and is devoted to the study and description of Peru, under its physical, moral and economical aspects.

The second number, dated May 15, has a monograph, written in 1886 by the naturalist Raimondi, lately deceased, on the phenomenon known as the *Callao Painter*, or *Barber*. (*El Pintor*, and *Aguaje*, in Spanish.)

This phenomenon is observed at Callao during the summer months, from December to April. It consists of emanations of sulphuretted hydrogen gas, accompanied by changes in the color of the sea-water. The English names, and the Spanish *El Pintor*, arose from the effect produced by the gas upon white paint, which becomes blackish, like the tint of oxidized silver.

The *Callao Barber*, first noticed, according to Raimondi, by Lieutenant Woolridge, of the British Navy, in 1847, is quite fully described by Hutchinson in his *Two Years in Peru*, London, 1873, Vol. 1, p. 219. Hutchinson attributed the emanation of the gas to submarine volcanic action; "knowing," he says, "that the whole coast of Perú is supervolcanic, as well as believing that Callao Bay has been the crater of an extinct volcano." He prints the results of an analysis of the Callao sea-water, a bottle of which, containing some mud from the bottom of the bay, was sent to London, and analyzed by Mr. T. Keates, Consulting Chemist to the Metropolitan Board of Works. After the water had been decanted, Mr. Keates found the black mud in a state of active decomposition, giving off large quantities of sulphuretted hydrogen gas, as well as sulphate of ammonia.

He says: "This mud appears to be ordinary river mud, or silt deposited at the mouth of a river, and lying in sea-water. It contains a considerable quantity of vegetable and some animal matter, and under the microscope shows abundance of diatomaceous remains."

Mr. Hutchinson took notes of the appearance of the bay water, in January, on four occasions. The water was, at first, ochre-brown, with a reddish tinge and opaque, and filled with animalcules of a circular form and colored like the water. Twelve hours after, the water was dark green and thick, with many animalcules shaped like an hour-glass. Fourteen to sixteen hours later, when the *Painter* smell was most nauseating, the water was of a muddyish white, and no animalcules were visible under the microscope. The fourth observation showed the water under its ordinary conditions.

Raimondi remarks that the changes of color do not always accompany the manifestation of the *Painter*. April 28, 1885, the water was so foul near the head of the wharf that many fishes, swimming near, perished; but there was no reddish discoloration of the water. This reddish color simply denotes the presence of infusoria brought in from the open sea. When these enter the harbor during the prevalence of the *Painter*, they die and, in a measure, add to the offensiveness of the odor.

The *Painter* is not peculiar to Callao. Raimondi's investigations proved that it shows itself at various points on the coast between Pisco (S. Lat. 13° 42′ 42″) and Paita (S. Lat. 5° 5′ 30″), and at Pacasmayo (S. Lat. 7° 24′ 20″), where the phenomenon is known by the name of *Salgaso*, the fish die in the poisoned water by thousands.

Raimondi rejects the theory of a volcanic origin for the gas. There is no foundation for the belief that the Bay of Callao is an extinct crater. On the contrary the formations are all alluvial in character, and the work for the construction of the quay showed that the bottom of the harbor was a bed of clayey mud about 20 feet in thickness.* Some have thought that the *Painter* was produced by an occasional strong current from the North, setting into the comparatively shallow harbor and stirring up the drainage from the city. The *Painter* occurs, on the contrary, when the current is from the South.

It has been suggested that the phenomenon is due to the quantities of organic matter brought down by the river Rimac in the freshets, which take place in the summer. While these freshets certainly contribute to the *Painter*, they are not of themselves sufficient to explain it; for then there would be a *Painter* at every point where a river emptied into the sea. Neither can it be admitted that the decomposition of matter from the city drains is the all-producing cause; for, if it were, there would be a constant, and not a periodical, manifestation.

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* The Encyclopædia Britannica, Ninth Edition, *art.* CALLAO, says, without quoting its authority: "the borings for the new works discovered the cause of this (the *Painter*) to be in strongly impregnated springs forcing their way up through a stratum of clay and mud." The discovery does not explain, however, why these springs regularly cease working in April and begin again in December.

Without making a final decision, for which the data are still wanting, Raimondi finds that certain conditions must exist simultaneously and co-operate in order to produce the *Painter*. There must be a marine current setting along the coast from South to North, a point or a chain of highlands projecting into the sea, and to the north, at no great distance, the mouth of a river. The Humboldt Current, passing the extremity of the point at Callao, flows right on without turning into the bay, while the water of the Rimac, flowing out, encounters the Current, and the mass of back-water, held on the north side of the point, is exposed, with all that it holds in suspension, to the full power of the tropical sun.*

Where there is no obstruction to shut off the current, as in that part of Callao exposed to the force of the waves and known by the name of *Mar Brava* (Rough Sea), there is no disengagement of gas. Where the river is wanting, as at Chorrillos and at Ancon, both protected against the southern current, the *Painter* is unknown. Paita is the extreme northern point at which the phenomenon has been observed, and it is at Paita that the Humboldt Current turns away from the coast.

THE SWITZERLAND OF THE NORTH.—This appears to be, according to *L'Esplorazione Commerciale*, of Milan, for June, and *La Geografia per Tutti* of Bergamo, for July 31, the recognized appellation of Finland, a region "remarkable for its wild and picturesque mountains." It seems ungracious to pass by Denmark and Prussia, in the search for a Switzerland of the North, but wisdom is justified of her children.

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* The summer temperature at Callao is about 20° (Fahr.) higher than the winter.

The Finns are as picturesque as their country: "The most affectionate and expansive cordiality prevails among the inhabitants, who embrace each other readily and frequently. The distinguishing mark of the Finlander is generally a red nose." * Was Bardolph a Finn?

What is the glory of Alp or of Apennine, compared with that of a land glowing with perpetual triumphs and everlasting bonfire-lights?

THE GIRONDE.—Mr. A. Hautreux, in the *Bulletin* of the Bordeaux Geographical Society, No. 12 for 1891, has an article, illustrated by 8 double size maps, showing the mouth of the Gironde, at as many epochs.

These maps are:

One of 1590, from the *Miroir de la Mer*, inexact as to distances, but full of interest. This map has a sketch of the Cordan tower before its reconstruction.

One of 1677, reduced from a chart in the Ministry of Marine. This is exact from every point of view, and shows the bank *La Mauvaise* 7 kilomètres (4.35 miles) N. W. of Cordouan, with its great light-house.

One of 1680, traced from that in the *Flambeau de la Mer*. This is inexact as to distances, but contains directions for entering the port.

One of 1751, reduced from Bélin's chart. In this also the distances are incorrectly given, but it shows the advance of *La Mauvaise* towards the N. W., and the commencement of obstruction in the pass of *Le Mattelier*.

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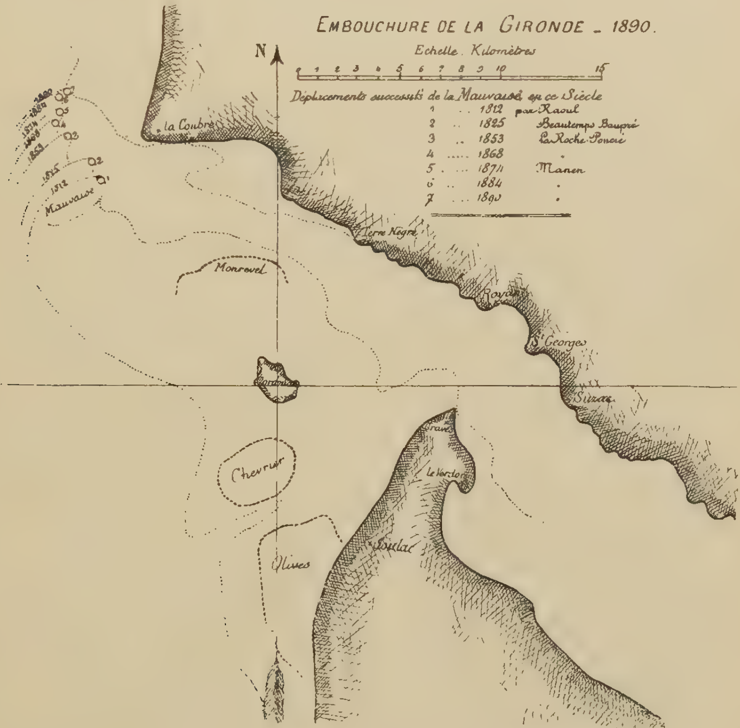
* Fra gli abitanti regna la cordialità più affettuosa ed espansiva: ci si abbraccia facilmente e di frequente. Il Finlandese ha comunemente quale marca particolare il naso rubicondo.—*L'Esplorazione Comm., Giugno, p. 232.*

One of 1798, reduced from the chart by Teulère. Incorrect in measurements, but records the opening of the *Passe du Nord*, the continued displacement of *La Mauvaise* and the increased accumulation of the sands, west of Cordouan.



FROM THE BULLETIN No. 12, 1891 OF THE SOC. DE GÉOGRAPHIE COMM. DE BORDEAUX.

One of 1812, reduced from Raoul's chart. This is very correct and, in the original, full of detail. It shows the final closing of the *Le Mattelier* pass and the deepening of the *Passe du Nord*.

La Mauvaise lies directly south of *La Coubre*, and

14 kilomètres (8.7 miles) from Cordouan; so that the bank had advanced 7 kilomètres (4.35 miles) since 1677, or about 50 mètres (164 feet) a year.

One of 1874 reduced from a hydrographic reconnoissance by Manen. It shows the continued movement of *La Mauvaise* toward the N. N. W., and the diminished depth of the *Passe du Nord*, a condition that increased during the succeeding years.

The last map, dated 1890, and here reproduced, brings into view the different positions, occupied by the bank of *La Mauvaise*, at the various epochs of the present century, until it is found closing in upon and uniting with *La Coubre* during the past year.

From 1812 to 1890 *La Mauvaise* advanced in all 5 kilomètres (3.11 miles); about 60 mètres (196.85 feet) a year.

The following table gives the depth in feet of the passes, *Le Mattelier*, *Passe du Nord* and *Passe de Graves*, at the several dates:

Year.	Passe du Mattelier Cordouan bearing.							Passe du Nord.	Passe de Graves.
	E.	ESE.	SE.	SSE.	S.	SSW.	SW.		
1590	65	70	100	90	100	110	110	9	15
1677	75	55	80	90	75	63	70	10	11
1680	50	50	50	50	100	100	50	20	20
1751	24	30	54	60	60	40	55	10	15
1798	40	33	33	90	48	57	63	30	15
1812	40	18	25	60	100	80	75	35	21
1874	45	21	30	60	90	75	60	27	15
1890								24	

This record of three centuries establishes two important facts: the stability of the *Passe de Graves*, which is east of Cordouan, and the continual movement in one direction of the sands to the west of Cordouan.

OBSERVATORY ON MONT BLANC.—Mr. Jansen, who was carried up Mont Blanc in the summer of 1890, has begun the work of constructing an observatory on the top of the mountain. The engineer in charge is M. Imfeld, and he tells of his difficulties in a letter to a Zurich paper. He is staying with eight workmen and two doctors at M. Vallot's cabin which is at an elevation of 4,400 metres (14,436 feet), and they proceed daily to the summit, where they work for several hours. M. Imfeld says that he has encountered traces of a ridge of rock eighteen to twenty metres (60 to 65 feet) below the summit, and covered with about one metre of snow. He has begun to make a series of tunnels on three sides, twelve metres (39 feet) below the summit, to ascertain if the ridge extends to that height. The men suffer from the rarefied air. In spite of coke stoves, the thermometer of the cabin never rises above zero; ink freezes, and water boils at 83° (centigrade scale; zero=32° Fahr., 83°=181°.4 Fahr.). To cook meat is impossible.

The workmen are discouraged, three of them having had hands and feet frostbitten. M. Imfeld increased their pay, but one man refused to remain. One night in August twenty inches of snow fell. August 21, M. Rothe and a guide named Simon slipped into a crevasse and were lost; and all the workmen were so alarmed by this accident that they quit work and M. Imfeld had to descend to Chamounix to engage others. In searching for the bodies of Rothe and Simon tunnels were dug at a depth of 10 metres (33 feet) below the edge of the crevasse, and the men found great difficulty in breathing. On Tuesday (August 25) they discovered a piece of cord 5 metres (16 feet) in length. They sent for help and twelve men started that night for the scene of action. The next day the bodies were recovered.

VOYAGE ON THE DANUBE.—The following letter, addressed to the President of this Society, tells its own story:

CANOE "CARIBBEE," ON THE DANUBE, JULY 21, 1891.

Dear Sir:

As a Fellow of the American Geographical Society I beg to report to your committee that I am at present making, in company with F. D. Millet of New York and Alfred Parsons of London, a voyage in an American-cruising-sailing and paddling-canoe from the source to the mouth of the Danube; sleeping each night in our 3 boats, cooking for ourselves and seeking so far as possible to study the condition of the countries we pass at very close quarters.

We have thus far reached the Hungarian border after passing through territory of Baden, Wurtemberg Prussia, Bavaria and Austria, and have before us Servia, Turkey, Roumania and Russia. If the cruise ends successfully it will, so far as I know, be the first consecutive voyage of the kind ever made on this river. I am, yours respectfully, POULTNEY BIGELOW.

THE IONIAN SEA.—Guido Cora's *Cosmos*, Vol. X, No. 7, presents in a table, illustrated by a colored map, the complete result of the soundings made in the Ionian Sea, in 1886–1887, by the steamer *Washington*, of the Italian Navy, under the command of Captain (now Rear-Admiral) Magnaghi.

The first eight soundings were taken in May, 1886, the rest in August, 1887. The longitude is calculated from the meridian of Greenwich, and the depths are in mètres. The three measurements of 4,055, 4,057 and 4,067 mètres (the last the greatest depth, 13,343 feet, yet found in the Mediterranean) occur within an area, to which Mr. Cora has given the appropriate name of the Abisso Magnaghi.

Lat. N.	Long. E.	Depth	Bottom.
38° 11′ 00″	16° 51′ 15″	1594	mud
38° 25′ 00″	17° 23′ 00″	1738	"
38° 35′ 00″	17° 49′ 05″	1800	"
38° 44′ 00″	18° 15′ 00″	2497	"
38° 53′ 00″	18° 35′ 00″	2451	"
39° 11′ 00″	18° 45′ 00″	1091	"
39° 33′ 18″	18° 55′ 50″	835	"
39° 49′ 50″	19° 16′ 28″	1065	"
36° 22′ 00″	16° 02′ 30″	3315	mud & sand
35° 52′ 25″	18° 18′ 30″	4067	mud
35° 39′ 40″	18° 38′ 00″	4055	"
36° 03′ 10″	18° 36′ 40″	4057	"
36° 30′ 00″	18° 28′ 00″	3976	"
36° 56′ 30″	18° 22′ 30″	3835	"
37° 28′ 40″	18° 18′ 30″	3116	"
37° 56′ 55″	18° 12′ 10″	2620	mud & rock
38° 21′ 30″	18° 08′ 40″	2673	mud
38° 58′ 00″	17° 52′ 00″	2080	"
39° 11′ 50″	17° 44′ 10″	1800	"
39° 32′ 55″	17° 36′ 30″	1669	"
39° 55′ 20″	17° 24′ 30″	1675	"
40° 12′ 30″	17° 17′ 10″	820	"
37° 57′ 25″	17° 04′ 20″	1810	"
37° 57′ 35″	17° 16′ 30″	1565	"
37° 57′ 20″	17° 29′ 30″	1890	"
37° 57′ 00″	17° 40′ 40″	2664	"
37° 57′ 25″	17° 54′ 30″	2710	"
37° 57′ 35″	18° 01′ 15″	2611	"
37° 58′ 15″	18° 09′ 00″	2530	"
37° 59′ 50″	18° 40′ 15″	3227	"
37° 55′ 20″	18° 18′ 50″	3066	"
37° 41′ 30″	18° 01′ 50″	2792	"
37° 26′ 20″	17° 43′ 50″	2733	"
37° 17′ 00″	16° 37′ 15″	2681	"

EGYPTIAN IRRIGATION.—Mr. Scott Moncrieff, Under Secretary of State, Public Works Department, Cairo, writes to *Nature*, of June 18, on the subject of irrigation in Egypt.

He makes two broad subdivisions of his subject: the irrigation effected by the Nile flood when there is rich muddy water in abundance for a land thrice as big as Egypt; and the irrigation effected by the Nile at its lowest in May and June, when the water surface is 20 feet below that of the field, and "when it is only by the strictest economy that we can water an area not exceeding one-fourth of the whole of Egypt."

The first irrigation is the ancient art, practised since the time of the Pharaohs. Its products are wheat, barley, beans, maize and rice.

The second system was introduced by Mohammed Ali, for the cultivation of sugar and cotton. It required deep canals, and the raising of the water in the river for diversion into them by a Barrage, or dam, at the apex of the Delta. This Barrage was constructed at a cost of £2,000,000. Soon after completion it cracked; and, from 1867 to 1883, it was practically useless. The network of canals was cleared every year to about 20 feet below the level of the land, and forced labor was employed upon the work for six months out of the twelve.

The Egyptian Government gave up the hope of using the Barrage. A contract was made for the irrigation of the Behera province by pumps, at an annual cost of between £50,000 and £60,000, and a similar arrangement was considered for the rest of the Delta, at an initial cost of £700,000 and an annual one of £250,000. No attention was paid to the drainage necessary for Lower Egypt, and in Upper Egypt there was a loss of revenue amounting to £38,000 a year, even in years of average Nile flood.

The English took charge of the irrigation in 1884, and to the question, frequently asked, whether there has not been, since then, a great addition to the cultivated area of Egypt, Mr. Scott-Moncrieff replies in the negative. Some extension there has been, notably to the west of Behera and in the Fayûm; and one much more important is in progress along all the north of the Delta, where marshes and lagoons are reclaimed by drainage.

The cultivated area of Egypt is about 5,000,000 acres. The area of the lagoons is 1,280,000 acres, and it is expected that at least half of this land will be reclaimed in a very few years.

What the English have done, are doing, and propose to do in future years, is as follows :

The Barrage has been completed and placed in a condition to fulfil its original purpose. From up-stream of it are derived three main trunk canals, which irrigate the whole Delta, and three smaller canals which irrigate all the country north-east of Cairo and to the south of Zagazig ; one of these takes water to Port Said and Suez. The outlay on the Barrage has been, since 1884, about £460,000. The Tewfikieh Canal, supplying the East Delta, has been made since 1886, at a cost of £372,000.

The Barrage diverts the whole summer supply of the Nile into these canals. So long as there is water in the river, it is under control, and the great cotton crop will be secured.

The Barrage has very largely increased the area of land that produces cotton, and since 1884, when it began to be used, the average annual yield of cotton has been 333,893 Kantars (15,000 tons) greater than in the five years preceding 1884. This makes a value of £835,000 a year, exclusive of the cotton-seeds.

Two main canals, one roughly parallel to each branch of the Nile, have been fitted with locks and rendered navigable ; and through these, when finished, laden boats will be enabled to pass freely between Cairo and

Alexandria on one side, and Cairo and Damietta on the other, at all seasons of the year.

Other locks have been built, and obstructions have been removed.

Year by year drainage arteries have been opened, and in Behera, Gharbieh, Dakahlieh, Sharkieh in Lower Egypt and in the Fayûm, large tracts have been reclaimed and now yield good crops. There are 1500 miles of drains, and the Budget for 1891 contains £140,000 for new drainage works in Lower Egypt.

The annual loss, already mentioned, of £38,000 in average years in Upper Egypt, where the Nile flood did not reach all the fields, has been very greatly exceeded in exceptional years. In 1877, the loss amounted to £1,111,880, and after 1888 it was about £300,000. Col. Ross, Inspector-General of Irrigation, has proved that by a judicious system of canals, sluices, siphons, escapes, weirs, etc., it may be arranged that, even in the worst years, the whole Nile valley shall receive its share of mud-charged water. This involves the construction of a great number of works costing from £5,000 to £15,000 each, built often in remote spots, where construction of any kind is difficult. These works have been going on for more than a year, and will probably be finished in 1893, at a total cost of about £600,000.

Until 1889, it would have been impossible to take a cart-load of agricultural produce from any one centre of population to another in the Delta. Riaz Pasha effected a reform, and now a whole network of serviceable roads is being made, with a fund raised by a tax of 4 or 5

Egyptian pounds (as many guineas) per *feddan* (about 1.1 acres) for one year only.

Before 1885, the work on the clearance and repairs of the canals and embankments was performed by the forced labor of the peasantry. This labor amounted in 1884 to 85,000 men's work for 160 days. It was estimated that to redeem this *corvée* and pay for all this labor would cost £400,000. Nubar Pasha, in the face of the greatest financial difficulty and opposition, managed to give an annual grant of £250,000 for the object; and Riaz Pasha, at the end of 1889, found the means of raising the remaining £150,000; and in 1890, for the first time perhaps in all history, there was no *corvée* in Egypt. A Canal Act has been passed but, unfortunately, its provisions are not binding on residents of foreign nationality.

A problem pressing for solution is that of providing means for the storage of the surplus Nile flood. There are two ways in which this may be done. The first is Mr. Cope Whitehouse's plan for diverting a portion of the flood into the great natural depression to the west of the Nile valley, and there forming a storage reservoir. The expense would be about £1,500,000. The alternative project, now being studied, is to pond up water in the valley of the river above Assûan. "There can be hardly further extension of the cotton cultivation," says Mr. Scott-Moncrieff, "if one or the other of these schemes is not executed. There is room enough in the country to employ both."

COLONEL WILLIAMS AND THE TEMPLE OF DELPHI.—Col. George W. Williams, an American who pointed out, in a letter addressed a year ago to the King of the Belgians, a number of alleged abuses in the administration of the Congo Free State, died in July last in London. *Le Mouvement Géographique* (Brussels) of August 9 refers to the event in these words: "The American traveller who, under the name of Colonel Williams, published in these latter days calumnious attacks upon the Congo, attacks which were here treated as they deserved, has just died in London. Mr. Williams had his moment of celebrity after the fashion of Erostratus, the incendiary who fired the Temple of Delphi."

Le Mouvement Géographique publishes none but "real and genuine news" (number of August 9, p. 74, *Postscriptum*), and its editor will be glad to learn that Colonel Williams wrote under his own name and honestly believed what he wrote. He may have been misinformed about the Congo Free State, but he had studied history and geography to some purpose, and he never would have gone to Delphi to look for Herostratus and the Temple of Diana at Ephesus.

PTOLEMY'S EASTERN NILE SOURCE, THE VICTORIA NYANZA.—Dr. Konrad Ganzenmüller, in a learned article in the *Zeitschrift für Wissenschaftliche Geographie, Bd. VIII, Heft 1*, seeks to show that the Ukerewe, or Victoria Nyanza, was known to Ptolemy as one of the two lakes from which the Nile took its rise; that, under the name of the Lake of the Crocodiles, it is described by an unknown Greek writer of the 5th, or the 6th, century; and that it is the Kura Kavar of the Arab writers. For Ptolemy himself Dr. Ganzenmüller entertains the deepest respect. He admits that the great geographer speaks almost wholly in names and numbers; but it is added, very truly, that those names and numbers are the expression of his thoughts, and that if we would comprehend these we must learn to understand his manner of speech, and must not presume to believe, with a recent writer on the history of ancient geography, that "his latitudes and longitudes are clearly worthless."*

Ptolemy calculated the length of a great circle at 180,000 stadia. The stadium contained 600 Attic, = 610 English feet; and 40 stadia would about equal a geographical mile.† He makes the circumference of the globe smaller than it is; but his longitudes can be brought into substantial agreement with the fact, if reduced by one-sixth; though the differences are found to increase in advancing from the west to the east. The longitude of Carthage is, according to Ptolemy, 34° 50′, deducting the sixth, 29° 2′ E. of Ferro; while its true position is 27° 40′, and the error is, therefore, only 1° 22′. Alexandria, placed under 60° 30′ (50° 25, after deduction of the sixth), lies under 47° 40′ and the error amounts to 2° 45′. Farther east, Susa has the longitude of 84°, corrected to 70°; its true longitude being 66° 30′, and the error 3° 30′. Following the indications of these examples and applying them to the position assigned by Ptolemy to the eastward lake of the Nile sources under the meridian of 65°, Dr. Ganzenmüller brings this, by deduction of a sixth, to 54° 10′, and then, by allowing 3° for the error from west to east, to 51° 10′ E. from Ferro, which agrees with the true position of the Ukerewe, or Victoria Nyanza, between 49° 25′ and 52° 25′ (31° 45′ and 34° 45′ E. from Greenwich).

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* The quotation is from Bunbury's *History of Ancient Geography among the Greeks and Romans from the Earliest Ages to the Fall of the Roman Empire: Vol. II, p. 614.*

† Dr. Ganzenmüller makes the geographical mile equal to 4 minutes.

This is, so far, satisfactory, but it does not restore the authority of Ptolemy. Not only does he make the circumference of the globe too small; he fixes the position of his prime meridian at least 7° too far to the east, and he gives the longitude of places, not according to observation, but by estimates of travel on land or by sea. He makes the Mediterranean 800 miles longer than it is; and what could he hope to measure, if not the Mediterranean? The elements of error in Ptolemy's figures are complicated, and Mr. Bunbury's language with regard to them is fully sustained by Delambre: "Here is more than enough to convince every unprejudiced reader that the geography of the ancients offers no one position upon which we can count. The latitudes are not always exact within a degree. Their longitudes could not have been determined within two degrees, except by an extraordinary chance. Errors of three and four degrees are not rare in the same country, and there are others much more serious, between one country and another. Chorography may derive some fruit from the study of the ancients; but for absolute positions, there is not a single one in which I should be disposed to have the smallest confidence, unless it were found to be confirmed by modern observations; and, in this case, a determination due to chance will never be anything more than a simple object of curiosity."*

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* En voici plus qu'il ne faut pour convaincre tout lecteur non prévenu, que la Géographie des anciens n'offre aucune position sur laquelle on puisse compter. Les latitudes ne sont pas toujours exactes à un degré près. Les longitudes n'auraient

This first part of Dr. Ganzenmüller's essay is less important than the argument to which he mainly addresses himself, the knowledge, that is, of the existence of the Nile sources by Ptolemy and the anonymous writer of the 5th or 6th century, as well as by the Arabs.

It cannot be said, indeed, that he proves his case, because the evidence is not of such a character as to compel its acceptance by an unwilling mind, but he does make it clear that Ptolemy placed the great lakes of which he had heard in something like their true position. Mr. Ravenstein (*Scottish Geographical Magazine, June, 1891*) makes short work of this approximation by *assuming* (it is his own word) that Ptolemy found the lakes correctly placed by Marinus somewhere in the northern Somal country, and "swept them far into the Interior"; a summary process which Mr. Ravenstein imitates when he affirms that Ptolemy "cannot even have read such standard authors as Strabo and Pliny."

The probabilities are in favor of Dr. Ganzenmüller's conclusion that the Kura Kavar of the Arabs is none other than the Ukerewe Nyanza, and that it is identical with Ptolemy's eastern lake of the Nile sources and with the Crocodile Lake of the anonymous Greek writer.

THE CAPTURE OF WADELAI.—The following intelligence was published in some New York papers of August 24 and 25:

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pu être fixées à 2° près, sans un hasard assez extraordinaire. Les erreurs de 3 à 4° ne sont pas rares dans une même contrée et il y en a de bien plus fortes d'un pays à l'autre. La Chorographie peut retirer quelque fruit de l'étude des anciens ; mais pour les positions absolues, il n'y en a pas une seule à laquelle je voulusse accorder la moindre confiance, à moins de la trouver confirmée par les observations modernes ; et dans ce cas, une détermination, due au hasard, ne sera tout au plus qu' un simple objet de curiosité.—*Histoire de l'Astronomie Ancienne, Tome II, p. 542.*

"BRUSSELS, August 24.—A communication in cipher has been received here from Stanley Falls, which indicates that Emin Pasha has been wonderfully successful in his operations in Africa. According to this despatch, Emin Pasha, at the time the message was sent, was resting at Wadelai, after having inflicted a thorough defeat upon the Dervishes.

"As a result of this battle he captured 6,000 tusks of ivory and a quantity of ammunition, arms and stores of many descriptions, and has re-occupied all the old stations in the Equatorial Province, and seems to have completely cowed the Dervishes."

The original appeared in a full-page supplement to *Le Mouvement Géographique* of August 23, as one of two communications received that day from "San Thomé." The head-lines of these communications read:

1. "The Germans on the Upper Nile—Capture of Wadelai by Emin Pasha—Defeat of the Dervishes at Doufilé—A treasure of 6,000 elephants' tusks—Death of Omar Saleh—The former province of Emin under the German protectorate.

5. "The Exploration of the Katanga—Junction of the Delcommune and LeMarinel expeditions—Imprisonment of the Missionary Arnot—Great battle against 3,000 natives—Defeat and death of Msiri—The caverns of Mkouamba—Discovery of mines of gold and mercury."

On p. 79 of the paper appears, at the bottom of the third column, this statement:

"OUR SUPPLEMENT.

"We add to this number a supplement, giving the text of two reports from Stanley Falls.

"This number is a vacation freak. The two despatches are false. They were fabricated at Brussels by us.

"In composing them we wished to prove that we also, quite as well as the telegraphic agencies, are in a position to publish sensational news concerning events which never happened.

"If any are tempted to contradict our despatches, we shall answer by telling them to wait for three or four months.

"In fact, our two announcements cannot possibly be contradicted for at least three months. Between this time and that, nobody will think of them any more, and we shall have bought very cheaply the luxury of beating all our rivals in the unexpectedness, the rapidity and the abundance of our advices.

"It will be remarked that the two despatches give good news. We could just as well have fashioned them in the doleful style, but we leave that specialty to those who do not shrink from such methods."*

This confession of sin is printed in small type, with other trifles, in a corner as far as possible from the Supplement to which it relates. The display of the fabrication and the modesty of the correction betray their relative nearness to the mind of their author; and those who have hitherto attached a value to the words of *Le Mouvement Géographique* will surely not repeat their offence.

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* NOTRE SUPPLÉMENT.—Nous joignons à ce numéro un supplément donnant le texte de deux dépêches des Stanley-Falls. Ce numéro est une fantaisie de vacances. Les deux dépêches sont fausses. Elles ont été fabriquées à Bruxelles par nous. En les rédigeant, nous avons voulu démontrer que nous aussi, ni plus ni moins que les agences télégraphiques, nous sommes à même de publier des nouvelles à sensation sur des événements qui ne se sont pas passés. A ceux qui seraient tentés de nous démentir nous répondrons en leur disant que nous les renvoyons à trois ou quatre mois.

En effet, nos deux nouvelles sont indémentables pendant au moins trois mois. D'ici là, plus personne n'y songera et nous nous serons payé à bon marché le luxe de battre tous nos concurrents par l'imprévu, la rapidité et l'abondance de nos informations. On remarquera que les deux nouvelles sont bonnes. Nous aurions tout aussi bien pu travailler dans le genre lugubre, mais nous laissons cette spécialité à ceux qui ne reculent pas devant de tels procédés.

THE CRAMPEL EXPEDITION. — Paul Crampel left Brazzaville, in the French Congo, August 16, 1890, at the head of an expedition, to reach Lake Tchad. He had with him four Europeans, Messrs. Nébout, Biscarrat, Orsi and Lauzière, an Arab interpreter, a Targui* interpreter, and the young Pahuin girl Niarinzhe, as Fan interpreter; and his caravan was composed of 30 armed Senegalese, 95 natives of various tribes, and 128 carriers. He reached Bangui, the farthest French post, situated on the bend of the Ubangi, on the 25th September. The commander of this post, M. Musy, had been killed and eaten some months before, and Crampel's first care was to restore the authority of the French in the region. In December he plunged into the unknown country, and the last letter received from him, which bore the date of January 19, 1891, told of his safe arrival on the river Zuvanga.

The next news, through native channels, reported the death of Orsi and Lauzière; and then came the following telegram from M. de Brazza to the Minister of the Colonies: "According to the last tidings from M. Dolisie, at Brazzaville, Crampel, who had gone forward, was assassinated on the 9th of April, together with Mohammed Ben Saïd, the Arab interpreter, and two Senegalese *tirailleurs.* Biscarrat, the commander of the escort, who had remained in camp, was also assassinated.

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* *Targui* is the singular of the word *Touareg*, the equivalent forms in English usage being *Touareg* and *Touaregs*, or *Tuaregs*.

"The rear-guard retreated, under command of M. Nébout, who was in charge of the caravan. It arrived at the post of Bangui, from which place the gunboat *Oubangui* took it on board for Brazzaville, where it was to arrive July 16."

A second telegram dated at Libreville, August 16, and addressed to the *Comité de l'Afrique Française,* confirms the news of the disaster and gives all the information yet received. M. de Brazza says:

"The latest intelligence that has reached Loango from Brazzaville bears date July 27 and confirms all our fears. M. Dolisie writes to me as follows: 'Brazzaville, July 26. A Loango child, a servant of Ben Saïd, the Arab physician of the expedition, appeared before M. Biscarrat on the 23d of May and told him of the murder of M. Crampel and Ben Saïd. Mussulmans had come from from El-Coutil to the camp, to offer their services to M. Biscarrat as porters. They were in reality emissaries, and they were only waiting for the arrival of M. Nébout with the rear-guard to kill the two white men together. They saw that the child recognized them, and this precipitated their purpose. M. Biscarrat was struck down with a knife; the child was also killed, as well as a Kréuman. Thomas (?) is the only man who can tell the whole story.'

"We have as yet no explanation concerning M. Nébout's return. We are left in doubt as to the completeness of the disaster. The gunboat *Djoué* started for

Bangui on the 20th of July, with M. Brunache, commanding the advanced guard of the Dybowski expedition.

"He is accompanied by the post commander Bobichon and is going to establish a station 200 kilometres (125 miles) from Bangui, on the route travelled by Crampel. The connections with the Ubangi will be carefully watched. The gunboat *Alima* also left on the 20th, taking Messrs. Brégeot, Briquez and Fraisse and M. Nébout, who returns to the front.

"M. Dybowski wants to start at the end of August with a gunboat; and he hopes to reach El-Coutil.

"It is only at Bangui that he will be able to receive a telegram from you.

"All the posts on the Ubangi and the Sanga will be reinforced. Three agents, fifty soldiers and a hundred and sixty recruits have arrived. M. Liotard is on the way to the advanced post of Oubanghi. M. Fourneau has returned to Stamboul.

"The exploration of the Sanga is continued and directed towards the supposed point where the catastrophe of the Crampel expedition took place. We may perhaps have some information by this route.

"BRAZZA."

Another French expedition, under M. Fourneau, also on the march to Lake Tchad, has been attacked and repulsed with loss; and two German parties, under Zintgraff and Morgen, have also been driven back. These checks serve only to stimulate both French and Germans, and to deepen their determination to reach and possess a portion, at least, of the lands on the great lake of the Sudan.

It is evident that the difficulties of the enterprise have been underestimated, but it will be carried through in spite of obstacles; and, rivals as they are, the Europeans may find it to their advantage to act in concert.

THE ELDER EXPLORATION OF AUSTRALIA.—The expedition fitted out, under the auspices of the South Australian Branch of the Royal Geographical Society of Australasia, by Sir Thomas Elder, of Adelaide, at a cost of £10,000, made its start on the 22d of April, 1891, for the unknown region of Central Australia, a tract of 500,000 square miles in extent. The enterprise is the sixth of the kind to which Sir Thomas Elder has devoted his time and influence and his ample means; and the suggestion of it came, it may be thought, from a passage in the inaugural address delivered in January, 1890, before the Australasian Science Association, in Melbourne, by the President, Baron Ferdinand von Mueller. He said:

> "Turning to geography, let here the question be asked, as concerning us most, how can Australian exploration be advanced? Talent, enthusiasm, and experience are available at any moment for the purpose. Our first historic century has passed; will the chronologic seculum also close ere the blanks on the map are filled up? If so, it would be almost a reproach; and may I be allowed to repeat, what in a geographic address was said some few months ago: 'The main work of Australian land exploration devolved on nine travellers only; now space seems only left for one more great explorer to rank with the nine. Who will be the tenth to carry off this last of honors, or will it be divided among several less ambitious competitors?' Well may the eagerness be understood, to set the life on winning such a prize."

The plan once conceived, Sir Thomas gave himself with energy to working out the details of its organization with the Council of the South Australian Branch of the Geographical Society.

The Branches of Victoria and New South Wales actively co-operated, and the matured project is described in the following extract from the Adelaide *South Australian Register*, of April 22:

> "By this morning's early train to the North the members of the expedition fitted out by Sir Thomas Elder, G. C. M. G., under the auspices of the Royal Geographical Society of Australasia, will start on their journey to the Peake. Two of the members—Mr. David Lindsay, the leader, and Dr. Elliott, the medical officer—do not propose to leave Adelaide till Monday next.
>
> "The principal members of the party have been appointed on the highest recommendations, including those of Baron von Mueller. Mr. Lindsay, the commander-in-chief, is certainly a well-tried explorer, and there is a general opinion that no expedition has gone forth better equipped for the perilous journeyings of the interior than the one which is about to start. Altogether there are fifteen in the expedition, including three scientific men, four Afghans, and an aboriginal lad. About forty-four camels will be taken on board the train at Farina, and the party will no doubt be well on their way next week.
>
> "Of course in such an expedition only an approximate route of the explorers can be stated. Leaving the Peake the expedition will go by way of Mr. A. B. Murray's Cootanoorina Head Station, where they will pick up the black boy who is to accompany them in their travels. Thence the route will be to the Everard Ranges, and striking west they will enter upon the unknown territory which lies between the tracks taken by the exploration parties led by Gosse in 1873, by Forrest in 1874, and by Giles in 1875. The country to be examined here represents a tract some 1,300 miles in length, with an average width of about 300 or 350 miles, and not even the explorers themselves know anything like the route that they will take. Their movements will depend very much upon the situation of the waters. Six or seven months' stores will, however, be supplied for this part of the journey. A stores depot will be established at the head waters of the Murchison, in Western Australia, at either Darlot's or Hope and Moore's stations, the provisions being sent up from Geraldton. Six months' stores will most likely be taken up at the Murchison, and then the explorers will proceed northwards to the Fitzroy, going up between the tracks of Giles in 1876 and Warburton in 1873—a strip of country roughly estimated to be 900 miles in length and 200 in width. In the ex-

ploration of the Kimberley country horses instead of camels will be used on account of the nature of the country to be explored. The next move will be into the Northern Territory to examine the land to the east of that explored by Warburton in 1873, Gregory in 1856, and Forrest in 1879. This is a patch of some 400 miles by 300 miles, lying between the Overland Telegraph Line and the Victoria River and Sturt's Creek, and it is in this region that Baron Von Mueller thinks there is a possibility of relics of Leichardt being found. At any rate Mr. Lindsay and his party intend to have a good search for some remains of this ill-fated explorer. The expedition will probably go south and northwards to Barrows Creek, and west and northwards to Daly Waters, and it is most likely that they will be asked to go on to the tableland to the eastward, and making south map in a few unexplored patches, and describe the country geographically. Stores depots will be established at Barrows Creek and elsewhere in the interior. After examining Northern Territory country and mapping some of the country that still remains a blank on the map, the expedition are expected to make their return journey to Adelaide along the eastern side of the Overland Telegraph line.

The members of the expedition are:

Mr. D. Lindsay, of Adelaide, leader.

Mr. F. W. Leech, of Adelaide, second in command.

Mr. L. A. Wells, of Adelaide, surveyor.

Dr. F. J. Elliot, of Townsville, medical officer and photographer.

Mr. V. Streich, of Adelaide, geologist, mineralogist, etc.

Mr. R. Helms, of Sydney, naturalist, entomologist, etc.

Messrs. R. G. Ramsay, of Adelaide, A. P. Gwynne, of Adelaide, C. A. Bowden and A. Warren, assistants.

The leader (Mr. D. Lindsay, F.R.G.S.), the commander of the expedition, is a son of the late Captain John Lindsay, and was born at Goolwa, South Australia, in June, 1856. Having explored the Mary River he proved that this was the stream which John McDouall Stuart was following in his memorable journey across the continent. Mr. Lindsay remained in the Territory until May, 1882, and during that time rendered invaluable service to the cause of exploration. He advised the route of the Northern Territory railway from Palmerston to Pine Creek, altogether distinct from that surveyed in 1878, and which, although slightly longer, it was said, would reach the agricultural land and the vicinity of the known gold and tin discoveries. Resigning his connection with the Government service in 1882 Mr. Lindsay came to Adelaide and undertook private business, but in 1883 he was commissioned by the Government to explore Arnheim's Land. The expedition, comprising six men all told, including a couple of blacks, took five months to complete the work. Their travels represented the traversing of nearly 2,000 miles of unexplored country, and were associated with most exciting incidents. The expedition led on by Mr. Lindsay with much intrepidity and skill was very successful, and the information given as the outcome of the trip resulted in the country being sold and stocked. Mr. W. Cuthbertson, of New Guinea fame, was second in command. Among important discoveries made by the explorers was that of the Gwendoline Falls, upwards of 195 ft. in height, on the Baker Range, some sixty miles from Southport. During 1884 and 1885 Mr. Lindsay was engaged in surveying on behalf of the Water Conservation Department in the Murray district and on the West Coast. In November, 1885, he started on an expedition, undertaken on his own account, to explore the country between the Dalhousie Springs and the Herbert. It was on this trip that he discovered "the ruby-fields" in the MacDonnell Ranges, and reported upon auriferous deposits there. At the Herbert River Mr. Lindsay, who was accompanied by a party of seven, commenced the survey of 550 miles of run boundaries and connecting with the Overland Telegraph line north of Powell's Creek. Thence he went down the Macarthur River to the new port of Borroloola. On this expedition eight camels were lost. This was his latest journey of exploration."

Leichardt, who left Sydney to cross Australia, in 1848, has not been heard of, and it is hoped that the present expedition may clear up the mystery of his fate. This object is to be kept in view, and the Geographical Society defines it:

"The leader is instructed to return with his party by a southeasterly route through the unmapped country to the eastward of the Transcontinental Telegraph Line in the Northern Territory [of South Australia] and Queensland; and one special object of this will be to follow up any trace of Leichardt if the search to the westward has proved fruitless. The hope of finding some traces of this lost party must not be given up so long as the remotest chance exists of making any discovery; and as there is good reason to believe that the route of the party has been reliably traced to a point in Queensland about lat. 23° 30′ S. long. 144° E., a zealous search may yet reveal some further information. The leader's special attention is called to this obligation as one of the objects of the expedition; and not only the leader, but all the members of the party, must be ever on the alert to seize upon the minutest facts which may be likely to throw some light upon this deeply interesting mystery."

The Royal Society of New South Wales offers its Medal and Money Prize for the best communication (provided it be of sufficient merit) containing the results of original research or observation upon each of the following subjects:

SERIES XI.—*To be sent in not later than 1st May, 1892.*

No. 37.—On the Iron Ore Deposits of New South Wales. The Society's Medal and £25.

38.—On the Effect which Settlement in Australia has produced upon Indigenous Vegetation; especially the depasturing of sheep and cattle. The Society's Medal and £25.

39.—On the Coals and Coal Measures of Australasia. The Society's Medal and £25.

SERIES XII.—*To be sent in not later than 1st May, 1893.*

No. 40.—Upon the Weapons, Utensils, and Manufactures of the Aborigines of Australia and Tasmania. The Society's Medal and £25.

41.—On the Effect of the Australian Climate upon the Physical Development of the Australian-born Population. The Society's Medal and £25.

42.—On the Injuries occasioned by Insect Pests upon Introduced Trees. The Society's Medal and £25.

The competition is in no way confined to Members of the Society, nor to residents in Australia, but is open to all without any restriction whatever, excepting that a Prize will not be awarded to a Member of the Council for the time being; neither will an award be made for a mere compilation, however meritorious in its way. The communication to be successful must be either wholly or in part the result of original observation or research on the part of the Contributor.

The Society is fully sensible that the money value of the Prize will not repay an investigator for the expenditure of his time and labor, but it is hoped that the honor will be regarded as a sufficient inducement and reward.

The successful Papers will be published in the Society's Annual Volume. Fifty reprint copies will be furnished to the Author free of expense.

Competitors are requested to write upon foolscap paper—on one side only. A motto must be used instead of the writer's name, and each Paper must be accompanied by a sealed envelope bearing the motto outside, and containing the writer's name and address inside.

All communications to be addressed to the Honorary Secretaries.

F. B. Kyngdon, } Hon. Secs.
W. H. Warren, }

The Society's House,
5 Elizabeth Street,
Sydney, 26th November, 1890.

TITLES OF SUBJECTS IN GEOGRAPHICAL JOURNALS.

Berlin—*Verhandlungen der Gesellschaft für Erdkunde.*

The Ninth German Geographical Congress, at Vienna, by G. Kollm—A Voyage to the Bonin and Volcano Islands, by Dr. O. Warburg—*Fead*, or *Faed* Islands?—The Investigation of the Uppermost Strata of the Atmosphere, by Prof. Dr. W. Förster—Prof. Dr. A. Bastian on his latest Journey in Central Asia.

Zeitschrift.

The Most Southern Part of Brazil (Rio Grande do Sul), by Dr. A. Heltner—The transverse Conical Projection, true to the surface, for the Map of Africa, by Dr. A. Bludau—From Peter Martyr's Letters: Notes from the History of the great Discoveries, by Eugen Gelcich.

EDINBURGH.—*The Scottish Geographical Magazine.*

British Civilization and Influence in Asia. By Arminius Vambéry—The Lake Region of Central Africa: A Contribution to the History of African Cartography. By E. G. Ravenstein—Definitions of Geographical Names. By Konrad Ganzenmüller, Ph. D.—Britannic Confederation: II. The Physical and Political Basis of National Unity. By Edward A. Freeman—Mapping and Place-Names of India. By James Burgess, LL.D., C. I. E., etc.—The Orthography of African Names and the Principles of Nomenclature. By W. A. Elmslie, M. B., C. M., Livingstonia Mission—Britannic Confederation: III. The Commerce of the British Empire. (*With Diagrams.*) By Geo. G. Chisholm, M. A., B. Sc.—How Maps are Made. By W. B. Blaikie. (*Illustrated.*)—Rewa River, Fiji. By H. H. Thiele. (*With a Map.*)—Britannic Confederation: IV. Tariffs and International Commerce. By Professor Shield Nicholson—The Geography of South-West Africa. By Dr. Henry Schlichter—Census of the United Kingdom, 1891.

GOTHA.—*Petermanns Mitteilungen.*

The Occupation of the Low Land between the Mouths of the Elbe and the Eider. By Dr. R. Hansen—The Valley of the Rio Grande, in

Mindanao. By Prof. Dr. F. Blumentritt—The Distribution and Expansion of the Races in Brazil according to our present Knowledge. By Dr. P. Ehrenreich—A Depression in the Centre of the Asiatic Continent. By Gen. A. von Tillo—The Sargasso Sea in the North Atlantic. By Prof. Dr. O. Krümmel—The North Polar Limit of the Inhabited and Habitable Earth. By Dr. Kurt Hassert—The Island of Zante. By Prof. Dr. J. Partsch—Results of K. von Ditmars' Explorations in Kamtschatka in the years 1851–55. By Dr. C. Diener—From the Victoria Nyanza by way of Tabora to Bagamoyo. By Dr. Wilhelm Junker—The Dividing Line of the Arctic Winds, and Recent Polar Projects. By Prof. Dr. A. Supan.

LIMA.—*Boletín de la Sociedad Geográfica.*

Introduction—Decrees for Foundation and Organization—District in the Province of Bongará—Meteorological Phenomenon in Ayacucho—Antonio Raimondi and His Work—Lecture on the River Purus—Phenomenon Called *El Pintor* (by Raimondi)—The Winds (Raimondi)—High Tableland of the Beni—The Amazonian Provinces of Peru as a Field for English Enterprise—Report on the District of Acobamba—Archæological Monument at Tarma—Restoration of the Campo de Chupas—Report of the Commission on the Collections left by Raimondi—Geology of Huanta.

LONDON. — *Proceedings of the Royal Geographical Society.*

The Annual Address on the Progress of Geography, 1890–91. By the Right Hon. Sir Mountstuart E. Grant Duff, G.C.S.I., President — The Indian Surveys, 1889–90 — Our Present Knowledge of the Himalayas. By Colonel H. C. B. Tanner (Indian Staff Corps) —Mr. Alfred Sharpe's Journey from Karonga (Nyassa) to Katanga (Msidi's Country) viâ the Northern Shore of Lake Mwero—Geographical Education : The Year's Progress at Oxford and Cambridge—Exploration of the Benue and its Northern Tributary, the Kebbi. By Major Claude M. Macdonald (H.M. Commissioner to the Oil Rivers)—The Volcanic Lake of Tritriva, Central Madagascar. By the Rev. James Sibree, Jun.—Ptolemy's Topography of Eastern Equatorial Africa. By Henry Schlichter—The Selkirk Range, North-West America. By Harold W. Topham.

MADRID.—*Boletín de la Sociedad Geográfica.*

Las Jurdes and Its Legends. By D. Vicente Barrantes—The Climate of Spain. By D. Antonio Blázquez—Report on the Condition of the Geographical Society. By D. R. Beltrán y Róspide—Review of Geographical Progress. By D. Martín Ferreiro.

MEXICO.—*Boletín de la Sociedad de Geografía y Estadística.*

Commemorative Session in honor of the Licentiate and Engineer Don Manuel Orozco y Berra—Origin of the Plural Terminations in the Nahuatl and in some other allied Tongues.

By Sr. V. Reyes—The Goddess of the Water and of the Moon. By Sr. V. Emilio Riedel—Notes on European Meteorological Observatories and Institutes, visited by Rafael Aguilar Santillán.

PARIS.—*Compte Rendu de la Société de Géographie.*

Dutreuil de Rhins in Central Asia—Causes of Chinese Emigration (de Groot)—Letter from M. Ponel on Crampel's Expedition—Travels of M. Quiquerez in Upper Guinea—M. Foa in South Africa—Dr. Ten Kate in the East Indian Archipelago—Notes of Count Meyners d'Estrey on the East Indies, on the Key Islands and on Time-Reckoning in the Philippines—Dr. Rae's Arctic Explorations—Prince R. Bonaparte's Notes on the Swiss Cantons (Unterwalden and Glaris) and on Corsica—M. Sabatier's work on *Touat, Sahara et Soudan*—Cheysson and Toqué on the "*Comparative View of Earnings and Expenses of One Hundred Workingmen's Families.*"—Garnier's Travels in America and in Canada—Gailly's *Manitoba* and the Canadian North-west—Proceedings at the Reception of M. Henri Coudreau and his Account of Travels in Guiana—Foundation of the Prize *Barbié du Bocage* (Gold Medal to be given every three years for the best work written in that time on French Geography, or written in French on a Geographical subject)—Another Foundation of a Gold Medal, the Prize *Louise Bourbonnaud,* to be given every year, to an explorer, French by nationality—Another Foundation, the Prize *Herbet-Fournet*, of a Gold Medal and a sum of 6,000 francs, to be given every two years to the author of the voyage (or travel) judged to be most important and most useful for the progress of geographical science; or, failing this, to the French explorer, whose travels are held to be most useful for the development of the French influence and international relations, or for the extension of the colonial territory; or, failing this, to the best travels performed for commercial studies and aims; or, finally, to the author of the best and most important work on geographical science. [The three Foundations described are due to the generosity of three ladies, the Marquise de Preaulx, Mme. Louise Bourbonnaud, and Mme. Herbet]—Congress of French Geographical Societies—International Geological Congress—M. Rolland on the Transsaharan Railway—M. Forest on Emigration from Morocco to the French Sudan—The Universal Hour—Vasseur and Carez, Geological Map of France—Tomb of Victor Jacquemont—M. Martel on the Subterranean Caverns of Austria and France—M. Venukoff's Russian Notes—Moser's Collections in Central Asia—M. Drapeyron on the *Geographical Course on Classical Instruction*—M. Meyners d'Estrey on Borneo—Schefer and Cordier's Travels of *Frère Odoric de Pordenone*—M. Paul Pelet's Atlas of the French Colonies—Leon Leleux's Photograph of Valsequa's Map (1439)—M. Alex. Boutroue on Portugal.

Bulletin.

Foureau's Expedition to the Tademayt—Jaime on the Niger, its Currents and Freshets—Rabot's Explorations in Russian Lapland—Tourane and the Centre of Annam (Gouin)—Coudreau's Notes on 53 Tribes of Guiana—French Geodesy (Lieut. Col. Bassot)—From the Ogowe to the Campo (Fourneau)—Lieut. Col. Humbert's French Sudan (with a map)—Gouin on the Annamite Costumes—Notes on a Map of America (1669), by Gabriel Marcel.

ROME.—*Bollettino della Società Geografica Italiana.*

Elio Modigliani among the Independent Bataks—Letter of Capt. E. Baudi di Vesme from the Peninsula of the Somali—From Asuncion to La Paz by Prof. L. Balzan—From Maj. Gaetano Casati's Book—The Emancipation of Colonies, by Prof. Dr. G. Coen—Tschungking, the New Chinese Port Opened to Europeans—From Berbera to Ime and the Harar, by E. Baudi di Vesme—From Toba Lake (Sumatra) to Pulo Bandar, by E. Modigliani.

SAN FRANCISCO—*Transactions and Proceedings of the Geographical Society of the Pacific, Vol. II, No. 1.*

Humboldt Bay, by Prof. George Davidson, A. M., Sc. D.—Geographical and Ethnographical Notes on Alaska, by Ivan Petroff—Corea, the Hermit Kingdom, by John T. Scott.

VIENNA.—*Mittheilungen der Kais. Königl. Geographischen Gesellschaft.*

On the Settlement of the Bukowina, by R. F. Kaindl—Remarks to accompany the Map of eastern Mindanao, by Prof. F. Blumentritt.

FINAL NOTE, *September 20.*

The American Geographical Society acknowledges the courtesy of the Minnesota State Historical Society and Mr. J. V. Brower, Commissioner of the Itasca State Park, in furnishing for the present BULLETIN the *Detailed Hydrographic Chart of the Ultimate Source of the Mississippi River.*

WASHINGTON LETTER.

WASHINGTON, SEPTEMBER 10, 1891.

Washington has had an epidemic of conventions. There is an impression abroad that this locality is a very proper one to leave alone in summer time. With the exception of two days, no more delightful temperature could be found in the United States than prevailed here during the month of August. Here is a list of the organizations that thoroughly enjoyed during that month the many attractions of the capital of the Nation :

The American Microscopical Society.

The Association of American Agricultural College and Experiment Stations.

The Association of Official Agricultural Chemists.

The Society for the Promotion of Agricultural Science.

The Conference of American Chemists.

The Association of Economic Entomologists.

The American Association for the Advancement of Science.

The Geological Society of America.

The Fifth International Congress of Geologists.

The Catholic Total Abstinence Union of America.

The Association of Amateur Oarsmen—Regatta.

The Old Time and Military Telegraphers.

During the month of September there will be reunions of the Congress of American Physicians and Surgeons, the American Pomological Society, delegates of Catholic Temperance Societies, the Supreme Council of Chosen Friends, and the Superintendents of the Railway Mail Service. And in October the Methodist Ecumenical Council.

The most numerously attended of these was the meeting of the American Association for the Advancement of Science. Six hundred and fifty-three members were present; three hundred and seventy-one new ones were elected. Two hundred and forty-five papers were announced in the eight sections, the largest number being in the section of Biology. There was a large amount of very eager interest, amounting in some cases to positive enthusiasm.

It will be quite impossible to do more than designate by letter some of the most notable productions:

SECTION A.—MATHEMATICS AND ASTRONOMY. 20 Papers.

Principles of the algebra of physics, by A. Macfarlane.

The secular variation of terrestrial latitude, by G. C. Comstock.

Latitude of Sayre Observatory, by C. L. Doolittle.

Exhibition and description of a new scientific instrument, the aurora-inclinometer, by Frank H. Bigelow.

SECTION B.—PHYSICS. 23 Papers.

A new method of measuring the expansion of solids, by E. W. Morley.

Do tornadoes whirl? By H. A. Hazen.

SECTION C.—CHEMISTRY. 37 Papers.

Synthesis of weighed quantities of water from weighed quantities of oxygen and hydrogen, by Edward W. Morley.

The influence of negative atoms and groups of atoms on organic compounds, by Paul C. Freer.

SECTION D.—MECHANICAL SCIENCE. 15 Papers.

On a method of holding samples of wood and brick for determination of tensile strength, by James E. Denton.

SECTION E.—GEOLOGY AND GEOGRAPHY. 30 Papers.

Preliminary report of observations on the deep well near Wheeling, West Va., by William Hallock.

The altitude of the eastern and central portions of the United States during the glacial period, by T. C. Chamberlin.

Neocene and pleistocene continent movements, by W J McGee.

The plant-bearing deposits of the American trias, by Lester F. Ward.

The relations of the Archean and Algonkian in the north west, by C. R. Van Hise.

New meteoric iron from Arizona, containing diamonds, by A. E. Foote.

SECTION F.—BIOLOGY. 64 Papers.

Uses of the fermentation tube in bacteriology, with demonstrations, by Theobald Smith.

Micro-organisms as insecticides, by C. V. Riley.

The present condition of the study of deep-sea fishes, by G. Brown Goode.

Another chapter in the history of the Venus fly trap by J. M. McFarlane.

On the importance of a table at the Naples station, by Charles W. Stiles.

The persistence and relation of faunal realms, by Theodore Gill.

SECTION H.—ANTHROPOLOGY. 30 Papers.

A linguistic map of North America, by J. W. Powell.

An experiment in human stirpiculture, by Anita Newcomb McGee.

Evidences of the high antiquity of man in America, by Thomas Wilson.

On the distribution of stone implements in the tide-water provinces, by W. H. Holmes.

Outlines of Zuñi creation and migration myths considered in their relation to the Ka-ka and other dramas or so-called dances, by Frank H. Cushing.

SECTION I.—ECONOMIC SCIENCE AND STATISTICS.

26 Papers.

The census counting machine, by J. S. Billings.

The southern oil fields, by W J McGee.

The artesian wells and underground waters of central Texas, by Robert T. Hill.

Free coinage ; Why not ? By Edward Atkinson.

The coinage ratio in our silver policy, by Edward T. Peters.

The local committee presented in an attractive form the "Programme"—192 pp., and a "Guide to Washington and its scientific institutions," accompanied by a 20-foot contour map of the district and adjacent portions of Maryland and Virginia.

The Guide is a concise and very admirable exposition of the District, City, Departments, Scientific Institutions and Libraries.

At the final meeting of the association Mr. G. Brown Goode gave an account of the history of this organization; stating that it had two parents,—the National Institution for the Promotion of Science, and the American Association of Geologists. When in 1848 the American Association for the Promotion of Science was founded in Philadelphia, one of the parent bodies contributed the first half of the name, viz., "The American Association," while the Washington society contributed the remainder—"For the Promotion of Science."

The National Institution above referred to, was very powerful for a time. In 1844 it had 1,600 names upon its rolls, and in that year organized in Washington the first national congress of scientific men ever held in America. President Tyler, John Quincy Adams and John C. Spencer presided at the meetings, and nearly fifty papers of great value were read.

The Secretary of the Association announced that the Government of Honduras had granted the Museum at Cambridge, Mass., the exclusive right to explore the scientific resources of that country for a period of ten years.

The excursions of the Association at this session included visits to Harper's Ferry, Old Point Comfort, Norfolk, Virginia Beach, Luray Cave, Atlantic City, and Mount Vernon.

The Geological Society of America held five sessions on the 24th and 25th of August. This society has a membership of 200, comprising the leading geologists of the country. Several eminent scientists from Germany, England, Russia, Belgium, Sweden and Roumania read papers and participated in the discussions at this meeting, as did also C. D. Wolcott, Lester A. Ward, R. A. F. Penrose, Jr., Bailey Willis, Thomas C. Chamberlin, Warren Upham, E. W. Hilgard and others.

The International Congress of Geologists,—one of the most celebrated scientific organizations in the world—began its fifth meeting on the 26th of August. Sessions were continued during six days. The Congress meets about once in every three years. The first meeting was held in Paris; the subsequent ones in Bologna, Berlin and London. The meeting just closed is the first one held in this country. Large numbers of the scientists who attended meetings of organizations, preceding this, remained over for the purpose of seeing men whose names are known the world over for their splendid researches and investigations. The honorary Presidents are two eminent Americans—James Hall and J. D. Dana. The President is also an American—the venerable J. S. Newberry.

There were present three members from Austria-Hungary, three from Canada, one from Chile, four from France, twenty-one from Germany, ten from Great Britain, three from Mexico, one from Peru, three from Roumania, seven from Russia, four from Sweden, two from Switzerland, and one hundred and fifty-seven from the United States; also delegates from seven foreign Governments, and nineteen foreign and American scientific organizations.

In the place of papers or essays prepared and read or submitted by their respective writers, the plan of the

International Congress contemplates the discussion of live geologic topics provisionally determined upon in advance, subject to the approval of the Council. The Council consists of the Founders' committee, 10 members; the Committee of organization, 34 members; and the Bureau, 64 members;—also the Presidents of Geological Societies and Directors of great Geological Surveys who may be attending the meeting. As at present constituted the Founders' Committee is mixed —American and foreign; the Committee of Organization entirely American; the Bureau, almost entirely foreign.

The business outlined consisted of: (1) Report of committee on classification and nomenclature, and discussion of same. (2) Report of committee on map of Europe, and discussion of same. (3) Discussion of classification of Pleistocene rocks. (4) Discussion of correlation. (5) Discussion of map notation.

No reports were submitted under the first two divisions, so that the attention of the Congress was in the main confined to the last three, viz.: the classification of Pleistocene rocks; correlation of geological formations,* and map-coloring and cartography.

A feature of this Congress was the trip of 6,000 miles to the most interesting geologic points, to terminate in New York, September 26th. The route arranged traverses thirty-nine degrees of longitude, and crosses twenty States and Territories and a Province of Canada. In each region of special geological interest the party will be guided by geologists † familiar with the ground. A large number availed themselves of this opportunity, using a special train of vestibuled cars which will be the home of the party during the principal portion of the journey.

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* The U. S. Geological Survey has in press a number of essays on this subject.

† Arnold Hague; J. P. Iddings; S. F. Emmons; G. K. Gilbert; Whitman Cross; J. W. Powell; N. H. Winchell.

No one present received such marked attention as the distinguished Paleontologist of New York. Professor James Hall, an incessant worker all his life, finds himself at eighty-one in the possession of the vigor and strength that few men have at forty. He is the Nestor of American geologists, and one of the founders of the International Congress. He attended the meeting in Paris in 1878, in Bologna in 1881, and in Berlin in 1885. At the session just ended the members gave him a special greeting in writing, subscribed by columns of names that would excite the envy of all the autograph collectors in Christendom. Prof. James Macfarlane once said: "The State of New York is to the geologist what the Holy Land is to the Christian, and the works of her Paleontologist are the old Testament Scripture of science."

RESULTS OF THE CENSUS.—There are some important developments in what (for the present) are termed minor mineral industries. The importation of Trinidad asphaltum into the United States increased in the decade between 1880 and 1890, from 3,913 to 54,692 tons.* This material, as is well known is chiefly used for street pavements, and its application to any great extent in this country seems to date from the year 1882. Prior to that date there had been laid 223,467 square yards; but in 1890 there was an aggregate of 6,803,054 square yards, equivalent to 446 miles of roadway 26 feet wide. It would seem that climatic efforts had little consideration in the application of the material to this purpose, as the range of cities where it is used extends from New Orleans to Quebec,—the largest proportion being in the north, if the city of Washington with its one hundred miles is included in this division. The State of New York claims the largest number of localities. About fifty-five thousand square yards of bituminous limestone pavement were laid in Washington and in New York City prior to 1884, but nearly all of this was subsequently taken up and replaced by Trinidad asphaltum. Captain F. V. Greene, of New York City, estimates that the total amount of bituminous limestone pavement now in use in the United States does not exceed seventy-five thousand square yards. The asphalt pavements in Europe are all made from this limestone. The total area covered is about one-fourth of that covered by Trinidad asphalt pavements in the United States, and exists in Berlin, London, Paris, and a few other cities, probably not exceeding ten in all.

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* Census bulletin, 1890, no. 75, by E. W. Parker.

The production of asphaltum in the United States to any appreciable extent dates as recently as the year 1888, when there was the very marked average of 50,000 tons over 4,000 in 1887, due to the discovery in California of bituminous rock (a sandstone formation impregnated with asphaltum), which came into the market as a competitor with other kinds of material for street paving. Until this remarkable formation in California, the island of Trinidad, France and Switzerland furnished the bulk of the world's supply.

The bituminous rock is more easily and cheaply prepared for street-paving purposes than any of the asphaltum products. In the case of the rock of Ventura and Santa Barbara counties, California, it is only necessary to mix it when heated with the sand of the locality where it is used, in the proportion of from three to eight times by bulk of sand to one of asphaltum. It requires only an hour after laying to "set" and be ready for traffic. Once properly mixed and laid, it seems practically indestructible. The bituminous rock of San Luis Obispo and Santa Cruz counties is thoroughly impregnated with bitumen. The only treatment necessary is to steam it, so as to thoroughly mix its ingredients and soften it for spreading to a uniform thickness and a smooth, even surface. It is reported that pavements made of this material fifteen years ago and used under heavy travel have recently been removed and found to have lost very little either in weight or thickness; also, that it stands equally well the high temperatures of the interior cities and the cold, damp atmosphere of the coast.

Notwithstanding these great advantages of the California bituminous works, Trinidad asphaltum is used for street paving in eastern cities to the almost entire exclusion of other kinds. The railroad freight rates from the Pacific coast practically shut out the bituminous rock from competition in the eastern cities. A similar condition inversely stated, may be said to affect the sale of Trinidad asphaltum in Europe, since the bituminous limestones of France and Switzerland, having the advantage in freights, control the markets. It is not unlikely that asphaltum deposits will be found in other portions of the United States.

The value of buhrstones and millstones produced in the United States has decreased from $150,000 in 1883 to $35,155 in 1889, and the importations from $125,072 in 1881 to $40,884 in 1889. This is due largely to the introduction of the roller process for grinding cereals. Proprietors of flouring mills not using the roller process prefer stones made from French buhr, a quality not yet found in the United States. The American product is found in the Allegheny range in New York, Pennsylvania, Virginia and North Carolina.

In the same region, and extending southward through South Carolina and Georgia, is found the American product of asbestos, which has shown an annual decrease since 1882. The product of that year was 1,200 tons; in 1889 it was 30 tons. But the imports of this article have increased from a valuation of $9,736 in 1880 to $263,393 in 1889. While the American article is said to stand a greater degree of heat than the foreign material, the fibre is more brittle and harsh, and not so well adapted to the manufacture of spun or woven goods.

The pyrites treated in the Census investigations includes only that mined for its sulphuric contents and used in the manufacture of sulphuric acid. It occurs more or less plentifully in almost every State of the Union, but its production during 1889 was limited to three States, New Hampshire, Massachusetts and Virginia, the largest being in Virginia. Considering the liberal distribution of pyrites and the economy with which sulphuric acid may be prepared from it, the production is as yet comparatively small. But more attention is now being paid to it, particularly in the Southern States. The increase of the product has been very marked, viz., 12,000 long tons in 1882 and 104,950 short tons in 1889.

Mr. R. L. Packard* says that aluminium has been attracting an amount of attention during the last two or three years which is out of proportion to its actual importance as a metal and the position in the arts which it has hitherto occupied. This is accounted for by the comparatively recent appearance of the metal in commerce, the difficulty of extracting it, and the unfamiliar and elaborate metallurgical processes which have been invented in consequence. Mr. Packard reviews briefly the history of these methods of extraction, from the date of Sir Humphry Davy's experiments in 1807 to the electro-metallurgical processes of the last decade. The pioneer of this last industry is the Cowles Electric Smelting and Aluminum Company at Lockport, N. Y., established in 1885. The total production of aluminium in the United States during 1889, including that contained in alloys was 47,468 pounds, with a value of $97,335.

Until the recent metallurgical use of aluminium in treating molten iron was introduced, the metal was worked in this country in a small way, principally for parts of optical, engineering, and astronomical instruments, balance beams, light weights, and the like where lightness and strength are desired. It had never been seen in any quantity until the Paris Exposition of 1855, where it was shown in ingots and in the form of manufactured articles. The price was then about $200 per pound. It was still somewhat of a curiosity at the Exposition of 1878, when it was exhibited in blocks, wire, sheets, and foil, and in various objects, from a thimble and penholder to dinner sets of aluminium bronze and metal. Telescopes, opera glasses, and other optical instruments, mounted wholly or in parts in aluminium, and chemical balances made of the same metal, were shown which were very light and strong. But the production from all sources—French, English and American—exclusive of alloys, from 1860 to 1889, did not exceed 116 tons—an inconsiderable quantity of metal. The indications are that the manufacture will be so largely increased from now on that this amount will soon be exceeded by the annual production.

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* Census Bulletin, 1890, no. 79.

The principal sources of aluminium have hitherto been cryolite from Greenland, and imported bauxite. The Greenland mine is near Arksut. In recent years, the Pennsylvania Salt Manufacturing Company has imported several thousand tons annually. A writer in the New York *Sun* describes the present appearance of the mine or quarry as "a hole in the ground, elliptical in shape, and say, 450 feet long by 150 wide." The pit is 100 feet deep, and drills have penetrated 140 feet deeper and found cryolite all the way.

The increased demand for alumina-bearing materials has called attention to American deposits of bauxite. It has been found in several places in Floyd County, Georgia, and recently in Saline and Pulaski counties, Arkansas.

Since the year 1880 the United States has become the largest copper producer in the world, outstripping by far any other country. Out of a total of 226,055,962 pounds produced in 1889, 217,264,304 pounds were from Montana, Michigan and Arizona. Arizona, after Michigan, became a great copper-producing region, and later Montana outstripped both, and now maintains its rank as the leader. The capital invested in the United States is $62,623,228; and the expenditure in 1889 was $12,062,180.

There has been a remarkable increase since 1880 in coal production in West Virginia, Kentucky, Tennessee and Virginia, viz., from 3,469,336 to 11,649,266 tons,—the highest rates of increase being in Virginia and Tennessee. No State in the Union* is more favored in the extent and diversity of its mineral deposits than West Virginia. Her coal embraces all grades of bituminous, steam, cooking, and gas coals of the highest qualities. The natural water-ways, improved slack-water navigation, and increasing railroad facilities are important factors in the development of the resources of the State, which must soon be accorded a leading position in wealth and industrial prosperity.

According to the Census returns of 1890, the limestone industry is ahead of all other stone interests. Of the various uses made of the stone the production of lime is the chief, followed by that used for building purposes, next for flux in furnaces, and finally for bridge, dam, and railroad work. For building purposes the stone produced in Illinois and Indiana far outranks the other States; while for lime, the products of Pennsylvania and Maine are exceptionally large. Of the total output more than one-half was produced in the North Central States. Geographically described the division was as follows:

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* Mr. John H. Jones, in Census Bulletin 1890, no. 94.

North Atlantic - - -	$6,491,834
South Atlantic - - -	464,171
North Central - - -	10,185,203
South Central - - -	937,351
Western - - - -	1,016,620
	$19,095,179

Costly and rash experiments in the use of limestone for outside building have brought about the exercise of discrimination in the selection or adaptation of this material for such purposes. But statistics are not given that throw any light on its relative use or disuse during the last ten, fifteen or twenty years.

In accordance with the present plan the final publications of the Eleventh Census (1890) will consist of the following volumes:

The Digest.

The Compendium:

Part 1—Population and social statistics.

Part 2—Wealth and industries.

Volume I.—Population—Robert P. Porter, Henry Gannett and William C. Hunt:

Part 1—Characteristics, conditions, distribution and parentage.

Part 2—Occupations.

Volume II.—Vital and social statistics—John S. Billings, surgeon, United States army:

Part 1—Mortality and vital statistics.

Part 2—Social statistics.

Part 3—Statistics of special classes.

Part 4—Frederick H. Wines—Crime, pauperism and benevolence.

Volume III.—Educational and church statistics:

Part 1—James H. Blodgett—Statistics of education and illiteracy.

Part 2—Henry K. Carroll—The religious bodies of the United States: Statistics showing the number of organizations, edifices and communicants; with historical and descriptive statements.

Volume IV.—Valuation, taxation and public indebtedness—J. Kendrick Upton and T. Campbell Copeland:

Part 1—Valuation and taxation.

Part 2—Receipts and expenditures.

Part 3—Indebtedness.

Volume V.—Farms, homes and mortgages—John S. Lord and George K. Holmes:

Part 1—Recorded Indebtedness.

Part 2—Ownership of farms and homes and indebtedness thereon.

Volume VI.—Agriculture:

Part 1—John Hyde—Statistics of farms: Irrigation, Frederick H. Newell; tobacco, Thomas N. Conrad; cereals, grass lands and forage crops, the fibres, forestry, sugar, live stock on farms, dairy products, wool, miscellaneous.

Part 2—Mortimer Whitehead—Horticulture, including truck farming, floriculture, seed farming, nurseries, tropic and semi tropic fruits, J. H. Hale; viticulture, live stock on ranges, live stock not on farms.

Volume VII.—Manufactures—Robert P. Porter and Frank R. Williams:

Part 1—General statistics of manufactures, statistics of specified industries, manufactures of cities.

Part 2—Reports of expert special agents, as follows:

Lumber-mills and saw mills and timber products, George A. Priest ; slaughtering and meat packing, Thomas C. MacMillan ; chemical manufactures and salt, Henry Bower ; clay and pottery products, Henry T. Cook ; coke and glass, Joseph D. Weeks ; cotton manufactures, Edward Stanwood ; dyeing and finishing of textiles, P. T. Wood ; electrical industry, Allen R. Foote ; manufactured gas, George W. Graeff ; iron and steel, Wm. M. Sweet ; printing, publishing and periodical press, wool manufacturers, S. N. North ; ship building, Charles E. Taft ; silk and silk goods, Byron Rose.

Part 3—Statistics of special industries : Agricultural implements, paper-mills, boots and shoes, leather, brick yards, flour and grist mills, cheese, butter and condensed milk factories, carriages and wagons ; leather.

Volume VIII.—The mineral industries of the United States—David T. Day ; iron ore, John Birkinbine ; gold and silver, Richard P. Rothwell ; copper, lead and zinc, Charles Kirchoff ; quicksilver, James B. Randol ; manganese, petroleum, natural gas, Joseph D. Weeks ; aluminium, R. L. Packard ; coal, John H. Jones ; stone, William C. Day ; precious stones, George F. Kunz ; mica, Lyman J. Childs ; mineral waters, Dr. A. C. Peale ; minor minerals, E. W. Parker.

Volume IX.—Fish and Fisheries—Charles F. Pidgin and Bert Fesler :

Part 1—Statistics of fisheries by geographical divisions.

Part 2—Statistics of fisheries by name.

Part 3—Appendix, containing scientific and proper names of fishes, with their geographical distribution ; illustrations of the principal food fishes of the United

States; condensed description of fish by species; statistical summary for each species for the United States.

Volume X.—Transportation—Henry C. Adams.

Part 1—Railroads: Statistics for the year ending June 30, 1890; statistics for ten years ending in 1889.

Part 2—Lake, ocean, river and canal transportation; Canals, T. C. Purdy; transportation on the Pacific coast, T. J. Vivian.

Part 3—Express business.

Part 4—Street railways, Charles H. Cooley.

Volume XI.—Insurance, Charles A. Jenney.

Volume XII.—Report and statistics of the condition of Indians living within the jurisdiction of the United States, 1890, taxed and untaxed, Thomas Donaldson.

Volume XIII.—Alaska, Ivan Petroff.

Veterans of the Civil War. (Seven volumes of 1000 pages each; publication not yet authorized.)

Statistical Atlas. (Publication not yet authorized.)

It is expected that the Compendium will be out of press by the time of the meeting of Congress in November. With the exception of eight or ten special agents gathering the fragments of information in relation to manufactures the field work of the Census is completed. Work has been commenced on the text of the final population volume and some of the maps are in course of preparation.

Aside from the Bulletins giving the population by minor civil divisions for each State, the following bulletins have been issued by the population division:

Bulletin No. 16—Population of the United States by States and Territories: 1890. The correct account, 62,622,250.

Bulletin No. 37—Population by counties: North Atlantic and South Atlantic divisions.

Bulletin No. 40—Population by counties: North central division.

Bulletin No. 42—Population by counties: South central and western divisions.

Bulletin No. 48—The white and colored population of the South: 1890.

Bulletin No. 52—Urban population in 1890, of cities containing 8,000 inhabitants or more.

In the veteran section 256,498 cards have been transcribed to date.

GEOGRAPHIC NAMES. When the United States Hydrographic Office requested the co-operation of maritime nations in establishing rules for the systematic spelling of geographic names all over the world, several inquiries were propounded. This was one of them: "Standard geographical dictionary, or authorities on geographical names (national, local and universal)?" The replies are valuable and interesting.

Great Britain. "We consider no geographical dictionary as a standard, and hunt up different authorities which we consider most worthy of credence for every separate district. Hunter's Dictionary has been adopted as the guide for Hindustan."—*W. J. L. Wharton, Captain R. N., Hydrographer.*

Spain. "The geographical dictionary by Don Pascual Madoz, published in 1845–50, is of a national character; also a dictionary of the corporations of Spain (cities and towns) by Señor Mariana. Of a general character there is the geographical dictionary by Riera, 1880–85; the Spanish-American Encyclopedia (being published); the Universal Geography, published in 1830 by a literary society. Of a chorographical character, the geographical dictionary of Navarra and of the provinces of Álava, Guipúzcoa and Biscay, published by the Royal Historical Society (Academy) in 1802; that of the island of Cuba, by Don Jacobo de la Pezuela, 1863; and that of the Philippine Islands, by Buceta and Bravo, 1850. The Royal Historical Society (Academy) published many years ago a vocabulary of geographic generic names, and recently has published another more complete, with the corresponding French names, by Don Juan Vilanova y Piera."—*Pelayo Alcalá Galiano.*

Chile. El Diccionario jeográfico de Chile, por F. S. Astaburuaga, New York, 1867. Un informe pasado a la Universidad, por Don B. Vicuña Mackenna, in the Annals of the University of 1863."—*Fco. Vidal Gormaz.*

Netherlands. "The kingdom of the Netherlands possesses no standard works concerning the spelling of geographical names of its country and its colonies; also, it has in that science no recognized authorities. The dictionary of geographical names in the Netherlands published by the Dutch Geographical Society (Woord enlijst van de Aardrijkskundige namen in Nederland van het Nederlandsch Aardrijkskundig Genootschap, 2d druk, Amsterdam, C. L. Brinkman) may, however, be regarded as a standard because a great many authors of geographical school books of the Netherlands, and chart and atlas makers follow it. As concerning the Dutch colonies in the East and West Indies there exists no dictionary that can be considered as authoritative."—*De D. V. Broecke, Captain, Hydrographer.*

Denmark. "Our authority on Danish names as used in charts and sailing directions is Statistisk-topografisk Beskrivelse of Kongeriget Denmark, ved I. P. Trap Kjóbenhavn 1879. On Icelandic names, Uppdráttr Islands á fjórum blödum (chart of Iceland in four sheets) published by the Literary Society of Iceland. On Greenlandic names, Den Grönlandske Ordbog af Sam. Kleinschmidt, 1871, published by the Church and School Department in Copenhagen."—*G. Holm, Director, Sókaart Archivet.*

China. "The best geographical dictionary is G. M. H. Playfair's Cities and Towns of China. London, Trubner & Co., 1879."—*A. M. Bisbee, Coast Inspector.*

Austria-Hungary. "We have for every province in the empire official repertories of the names of every place in it, viz.: Special Ortsrepertorium von Steiermark, Kärnten, Krain, Böhmen, etc.; also Geographisch Statistisches Repertorium der bewohnten Orte im Königreich Dalmatien, Slovnik Geografizmy (Geographisches Lexicon) des Königreichs Polen und anderer Slavischer Länder; Ortslexikon des Königreichs Polen; Ortschafts-und-Bevölkerungs-Statistik Bosniens und der Hercegovina. The names of places in the kingdom of Hungary are contained in the Ortslexikon von Ungarn by Jekelfalussy, and in the Postlexikon der Länder der ungarischen Krone. For the adjacent part of Russia, Ortslexikon von Russland. We consider generally the geographic appendix to Webster's Dictionary to contain the best system of the pronunciation of geographic appellations originating in different languages but spelled in English."—*F. Baron de Haan, Captain I. and R. Navy, Vorstand des K. K. Küstenbeschreibungs-Bureaus.*

The third Bulletin of the United States Board on Geographic Names contains decisions rendered at the instance of the Light-House Board. They relate to geographical features upon the sea and lake coasts, and upon the navigable rivers of the United States, and concern merely the elision of the possessive form of the name. It is understood that the fourth Bulletin will relate to the names of counties, cities and towns.

DICTIONARY OF ALTITUDES.—The second edition of Mr. Henry Gannett's Dictionary of Altitudes* might well be called a *New Dictionary of Altitudes.* The large amount of new matter, and the substitution of a single alphabetic arrangement for an alphabetic arrangement by States gives it the character of a new work. The number of localities given is approximately twenty-four thousand, being an increase of about six thousand. The data are mainly from Government and State surveys, city engineers' reports, the Mississippi and Missouri River Commissions, and railroad corporations. As to the latter, that is to say, the profiles of railroads, the editor gives them a high value. Many of them, he says, are wonderfully accurate, some comparing favorably with the precise levelling of the Coast and Geodetic Survey, and the Mississippi and Missouri River Commissions. Mr. Gannett has in his possession abstracts of the profiles of more than *nine-tenths* of the railroad mileage of the country, which he finds of the greatest value in the preparation of topographic maps. He accepted the profiles of the Pennsylvania railroads, published in Appendix NN of the reports of the Second Geological Survey of Pennsylvania, but the profiles of railroads in New Hampshire, Virginia, North Carolina, Alabama, Ohio, Indiana, Wisconsin, Minnesota and Iowa published in reports of geological surveys of those States, that were used quite fully in the first edition, have been in large part supplanted by profiles recently received from the railroads, "which are presumably more accurate." The adjustment of levels has been less perplexing than formerly, because of the lines of precise levels which have been run by the Coast Survey and the Mississippi and Missouri River Commissions. The changes of leading railroad centres by re-adjustments are not great. Cincinnati has been lowered eight feet, Kansas City has been raised two feet, Omaha one foot, and Denver seven feet. In the case of less important points, the changes have been, in many cases, of greater amount.

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* U. S. Geol. Survey: Bulletin No. 76.

The work done by the War Department between 1850 and 1855 for the purpose of finding a practicable railroad route to the Pacific (*Pacific Railroad Reports*) Mr. Gannett says, taken as a whole is poor, owing mainly to the fact that practically there were no barometric base stations. The hypsometric work of the expedition near the northern boundary under Governor Stevens was particularly bad. These remarks concerning the quality of the work apply equally well to all the earlier expeditions to the west, owing doubtless to the same cause.

GEOLOGICAL PHOTOGRAPHS.—The Geologic Society of America has arranged for the collection, preservation and systematic registration of photographs of geologic interest in the United States. The object of the movement is to make a photo-geologic survey, and secure a national collection of photographs illustrating the geology of the country in order that investigatiors may have material for comparative study, and teachers better illustrations to use in teaching geology. It has already received several hundred photographs, which have been classified, catalogued, and temporarily bound in the form of books; and a scale of prices arranged for mounted or unmounted copies. The committee, consisting of Prof. J. F. Kemp, Ithaca, N. Y.; Prof. W. M. Davis, Cambridge, Mass.; and J. S. Diller, U. S. Geol. Survey, Washington, solicit the donation of good photographs which clearly illustrate important geologic phenomena, among which may be mentioned typical views of eruptive and sedimentary rocks, of dikes, bosses, contacts, transitions, folds, faults, jointing, cleavage, weathering, glaciers, etc.

ALASKA.—The latest advices from the Alaska boundary survey party, dated June 20, 1891, are from Camp Davidson, Upper Yukon River, near eastern boundary. This survey, it will be remembered, is to secure data to be used by the Government in the negotiation, adjustment, and definite settlement and location of the boundary between Alaska and British Columbia, and is being made by the United States Coast and Geodetic Survey at the instance of the Department of State.

The health of the party, under Mr. J. E. McGrath, has been excellent in the main during two years in a severe region. The autumn months of 1890 proved very unfavorable, September being marked by almost continuous rain, and October and November very cloudy. On May 9th of this year the first interior contact of Mercury with the sun was observed, and on the

6th of June the partial eclipse of the sun. A number of photographs of both these phenomena were taken. Regular monthly sets of magnetics were observed through the whole season, and the declination was observed every fifteen minutes through twenty-four hours on one day in each month, during the last three months. Meteorological observations were carried through without interruption, readings being recorded three times a day.

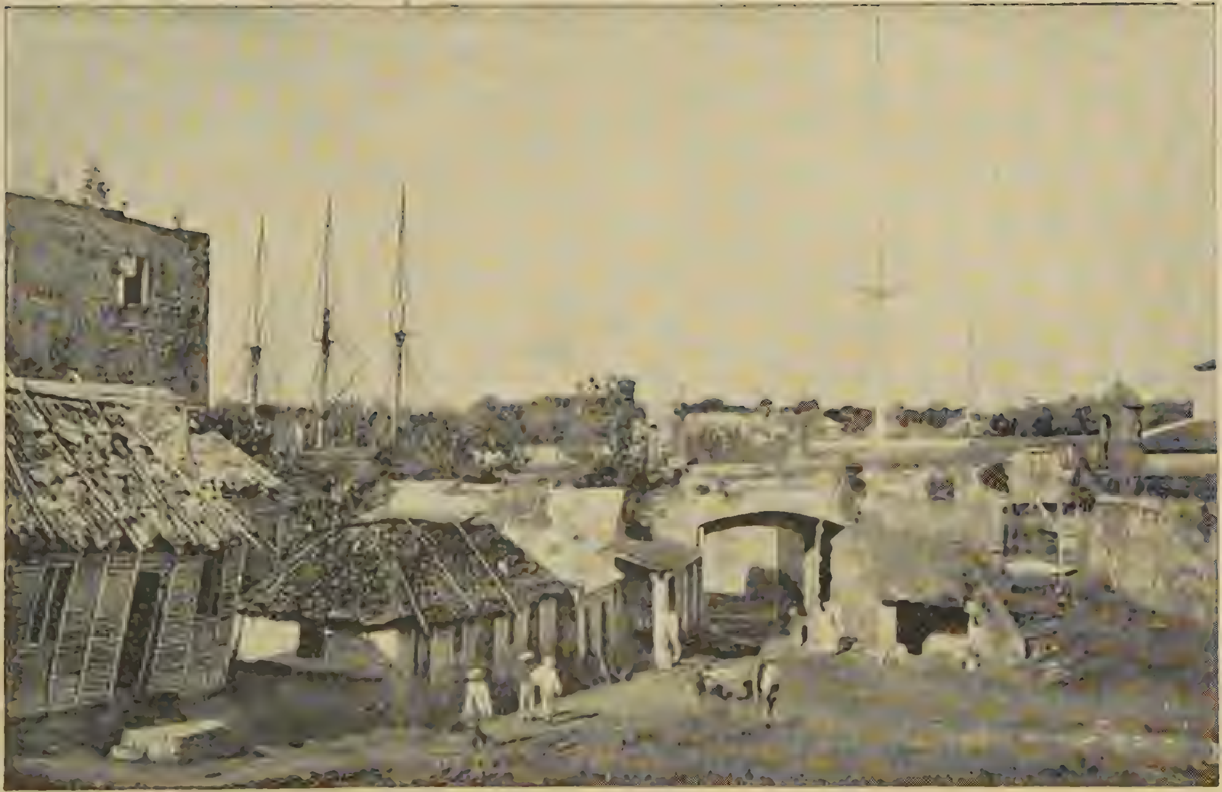
Plenty of provisions came up for the party last year, as a great many of the articles, that were wrecked in 1889 belonging to both parties, were sent to one point (Camp Davidson), together with some supplies from the Alaska Commercial Company's stock at St. Michaels. As it happened that the traders at Forty mile creek did not receive much of a supply, the extra quantity that came was a welcome addition to the stock in the country, and was of material benefit to whites and Indians. Everything that could be spared was eagerly picked up, the white men paying for their goods in gold dust, and the Indians trading meat, moccasins, etc., for their share. Game was very scarce.

The average temperature of the months, after last December, showed an increase of a few degrees over the same months last year. The lowest minimum temperature was secured January 16th, viz.: 60° 5′ below zero.

Mr. McGrath expected to reach St. Michaels, homeward bound, by the 25th of August.

Dr. W. C. Kingsbury, the surgeon of the party, has already returned, having reached St. Louis—his home—August 23d. He says that valuable collections of small animals, birds, insects, and flowers have been secured, that the country along the upper Yukon is fast filling up with people who have the gold fever, and that miners are excited over prospects of fortune. He also says that the result of the Government Survey has been most satisfactory.

Nothing has yet been heard from Mr. Israel C. Russell who went to Alaska via Icy Bay, under the auspices of the National Geographic Society to explore further the region about Mount St. Elias. H.



DON DIEGO GATE AND PALACE, SANTO DOMINGO.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXIII **1891** **No. 4**

SANTO DOMINGO CITY.

BY

NATHAN APPLETON.

Santo Domingo! The oldest European city in the Western Hemisphere! The cradle of that extraordinary movement of European or Old World energy and pioneering, which, having begun nearly four hundred years ago, has been sweeping across the Atlantic Ocean with increasing intensity ever since. Here at any rate was the beginning, here was the dawn of the new era of civilization and progress. In this city you have a feeling of appreciation of what the current meant, what it was intended to accomplish, that no other place in the New World can give you. By a little flight of imagination you can people the streets again with those who were here in the beginning of the sixteenth century. You can see the great Admiral, Christopher Columbus himself, of whom there is a superb bronze statue by the French sculptor Guilbert in the Cathedral plaza, with an Indian maiden below, writing a tribute to his fame. You can see his brother and son, Bartholomew and Diego. You can see his companions and followers, Ojeda, Balboa, Pizarro, Oviedo, Ponce de León, Cortés, Enciso, De Soto, Bobadilla, Ovando, Las Casas and a host of others, soldiers and sailors, priests of many religious orders, merchants and marauders, and a crowd of those who had come to seek their fortunes in the island of Hispaniola, or in the many other places, to reach which Santo Domingo City was the rendezvous and point of departure. The soft tropical air is full of the romance of the past, a romance often suggestive of noble deeds and aspirations for a true and progressive civilization, on the one hand, and, on the other, filled with deeds of cruelty and stained with a shedding of innocent blood which has been a tale of horror to the world ever since.

But let us leave all this flight of fancy for the present, and imagine ourselves dropping anchor in the bay, or open roadstead, about half a mile from the city itself. A boat will soon take us to the wharf by the Custom House on the Ozama river, which is the real harbor, and, as we are rowed comfortably along, with an umbrella to keep off the rays of the sun, we can get a very good idea of the place, as seen from the sea, just as it was and is. The line of walls on the sea front, or south side, is about 1,000 yards in very good condition, and broken here and there with forts and bastions, their stone sentry boxes still defying the touch of man or the elements. A modern lighthouse, with spiral steps and a revolving colored light, is just about midway, and behind you see the roofs of the houses, with here and there the dome of a church, and dotted about in various places the graceful palm, mango and other tropical trees. As you reach the junction of the Ozama river and the sea, you obtain a splendid view of the citadel, or principal fortification of the place, and, standing well up in the centre, and dominating the mass of buildings, is the tower or prison. It is an imposing structure, perhaps as much to-day when used as a signal tower for all vessels approaching the harbor, as in former times when it was more to protect the city from the attacks of vessels, which did not come on missions of peace and commerce.

You see the fort with its water batteries and inclined approaches, and places which in bygone days were bristling with guns. It will well repay one to make a visit inside, for it is very extensive, and with its outlook over the river and ocean, could easily be turned into a delightful promenade or pleasure resort, at the same time not removing one of the old stones, or taking away the antiquated guns and other relics, of which there are many. The buildings could readily be put in comfortable and habitable shape, so as to be used not only as barracks for soldiers or sailors, but for any other purpose, such as a hospital, or simple dwellings.

Strolling about one afternoon I came across a quantity of old Spanish guns, which would be a curiosity in any national museum, as they had those great uncouth wheels made out of four pieces of wood, as you see in old prints, and in this case the wood was mahogany.* I saw also a French gun dated 1776, a date very dear to us Americans, and also a piece of modern American design, the three inch rifled, or ordnance gun, which I well remembered, as it was just the same as some I served with in the Army of the Potomac more than twenty-five years ago. An old anvil I also noticed, and, though made of wood, mahogany or some harder kind, it looked as if it had stood the blows of centuries, and was good for service still.

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* One of these gun carriages, given to the writer, is now in the U. S. National Museum at Washington.

That the buildings comprising the citadel or arsenal have been put up at various times, and are not all very old, can be seen from the following inscription, which is over the most imposing gate on Colon (Columbus) Street. Between two tall Doric columns in good preservation, and with ornaments above, these words have been cut in the stone :

SE EDIFICO
REINANDO CARLOS III.
AÑO
MDCCLXXXVII.

On the side of the Ozama river the walls are about 1,100 yards long, and then turning at a right angle, and so continuing for a short distance they deflect toward the west, and are built on the incline of the hill, and in a straight line for 1,700 yards towards the village of San Carlos. A fourth side of the five sided city brings you to the ocean and southwest corner of the city, making its entire circumference about 4,500 yards.

There were originally but two gates, that on the Ozama river, called the Puerta Diego, in honor of the son of Columbus, and another at the western side of the town known as the Puerta del Conde at the end of the street de la Separacion, and not far from the northwestern angle of the city, which leads directly into the country. The walls, generally speaking, are in a very good state of preservation, though the needs of modern circulation of men and merchandise have caused several new gates to be opened, but they interfere little with the general harmony of the lines. In one place the wall has recently tumbled down for a short distance, but the tropical vegetation will soon cover it, and perhaps only add to the picturesque effect. The most striking view of them is along the slope on the northern side, where there are some six forts or bastions, so arranged that guns could sweep all the converging country roads.

The configuration of the ground is such that a driveway could easily be made both inside and outside the walls, while the pedestrian could, with a few repairs in different places, make nearly the circuit of the city on the walls themselves, which are of great thickness. I do not hesitate to state that there is no walled city in the world of the size and date of Santo Domingo which is more interesting archæologically and constructively, while the wonderful tropical vegetation softens the effect by half covering it with luxurious growth. Were its beauties and historical features better known, it would be visited by hundreds of thousands of persons from all parts of the world.

Certainly next in interest, (if not indeed before) to the fortifications and walls, come the churches, convents and nunneries. The two latter have been abolished for a long time, and their buildings are either ruins, or have been put to some other use ; while most of the churches, including the Cathedral, are still devoted to the service of the Church of Rome. It is curious to note, especially in the Spanish colonies, how the sword of the soldier was followed by the gown of the priest, and the terrorism of destroying the body was supplanted by that of the supposed saving of the soul, so that the poor natives, with their simple religion of tradition, were in the difficult position of a choice of evils.

Of the religious ruins by far the grandest is that of the San Franciscan convent and church, which you reach by a stroll of about a quarter of a mile up a gentle incline from the Diego gate. From the side wall of the principal chapel away back through the cloisters and refectory to a well in the rear must be between four and five hundred feet, while the land included in the buildings is several acres in extent. As a ruin it is picturesque in the extreme, with trees growing on its very summit, and a mass of vegetation and ferns and wild flowers below. Over the entrance of the convent are the twisted cords of the Franciscan Order of monks, while under the main portal of the church, or near it, in a side chapel, tradition says that the body of Alonso de Ojeda reposes, who expressed as his dying wish that he, after his checkered career, should be allowed to lie there in peace to prove the mutability of human life. Several attempts have been made to find his bones, but without success. Part of the building is now used as an asylum for the insane.

The hotel in which this was written, known as the Hotel Français or Philipot, from the energetic Frenchman who is its proprietor and who presides over the cuisine as only a Frenchman can, was formerly the priory of the Franciscan convent, as can be seen from the twisted tassels of the Order also over its principal door. There is one large gargoyle or ornamented waterspout, remaining under its eaves, representing what looks like a huge monkey. From the open balcony at which the meals are taken there is a beautiful view of the ruins not far in the rear. Tradition has it that formerly the priory was connected with the convent by a subterranean passage, and this seems quite possible from the brick and concrete arches and the remains of walls which are in the yard. The walls of the building are two feet in thickness, and the roof is supported by solid mahogany beams.

INTERIOR OF THE FRANCISCAN CONVENT, SANTO DOMINGO.

After the Franciscan, the Dominican church and convent merit most attention, as their remains are very spacious and interesting. The building is situated a little to the east of the centre of the water front on the sea, and three streets back. Part of it is now put to the meritorious use of an evening normal school, well attended by young workingmen of the city, who cannot leave their trades or occupations during the day-time.

Next should come the Jesuit church and convent, which is now a theatre, and is situated on Colon Street about the centre of the river frontage. From the importance of these three structures it is easy to imagine that there was great rivalry among these three Orders to obtain the mastery in Santo Domingo, and it is probable that between them the Inquisition, with all its horrors, had full sway.

Of the few nunneries that of Santa Clara is now partly in repair, and under the care of some worthy Sisters of Charity, as a home for friendless orphans, and thus also in modern times turned to a good purpose.

The Cathedral in the plaza is a fine building, though it has no high towers, probably from the danger of earthquakes. In it are some handsome chapels, one with a carved reclining figure of Bishop Rodrigo de Bastidas, of Porto Rico, whose father was a friend of Columbus. Here also are the bones of the discoverer Columbus, which are kept in two caskets, one inside the other, under the separate lock and key of three priests, but which are shown to visitors at times on proper application. Near to the Cathedral is the palace of the Archbishop of Santo Domingo, a handsome and comfortable house for the first dignitary of the Church here. The Cathedral was finished in the first half of the sixteenth century, and has been kept in good repair, so that services are now held there. The building is of light yellow, a very common color here, with facings of white. The principal porch, which is on Consistorial Street, is ornamented with some fine carvings in the stone, and there are also some frescoes of saints that have considerable merit. Farther along to the right in the wall there is a grated niche with a painting of the Saviour, before which candles are generally kept burning.

The Cathedral, with the two churches, Santa Barbara at the end of the street del Comercio in the north part of the city and by the fort of the same name, and the Church de la Rejina in the street de la Universidad, two squares to the west of the Dominican building already mentioned, give an excellent idea of the prevailing color you see in almost all the buildings in the city. The former of these is a bright red, and the latter a clear azure blue, both of them faced, like the Cathedral, with white.

Many of the old houses have at times been painted these different colors, and with the dull gray of age and the blending of the tints do not present a disagreeable sight. Then with the tiled roofs of brick the effect is subdued and made more attractive.

The Church de las Mercedes still exists and is used, though the convent and cloisters adjoining are in ruins. That of San Nicolas is one of the most interesting relics of the old days of Spanish settlement, as it was named after Nicolas Ovando, governor of the place, who doubtless superintended its construction. Very probably it is one of the earliest buildings there, dating from the time when the present Santo Domingo was founded, and this was in 1502. The ruin is very picturesque, with arches in fair condition, and the remains of columns, while over the main door in the street de la Esperanza is left part of a mosaic cross composed of old

Spanish tiles, embedded in the stone. Part of the grounds are now devoted to a private hospital under the care of Dr. Ponce de León.

The little church of San Antonio is a pretty ruin near the northern wall, those of San Miguel and San Lázaro are in use, as also that of del Carmen and the chapel de los Remedios close to the Ozama river, but quite a distance above, as the bank here is high. Near to it is a sun dial which gives the time to-day for all as when it was erected in 1753, as the inscription upon it records.

Of the public buildings of the past in Santo Domingo the most striking is the palace of Diego Colon, the son of the Admiral. It is a fine ruin, and must have been a superb habitation if ever finished and lived in. But here comes in the obscurity, which seems to hang over everything connected with the history of the city. Some will say that it was never occupied, but others think it was partially so, and that Diego, who brought over his wife and quite a retinue of relatives and court followers, used to live in such style that he excited jealousy in Spain. At any rate he went to Spain in 1523, and did not return to Hispaniola.

There is an interesting building in Consistorial Street which is called the Mint, and very likely it was devoted to that purpose, for it does not appear from its construction to have been a private house, and doubtless in the early days much bullion came to Santo Domingo from Mexico and Peru to be melted down and coined. Opposite there is a façade of a house with a medallion head of Christopher Columbus, and others, probably one of King Ferdinand, and two allegorical heads above.

Not far from it is what is known as the "House of the Three Stories" from the mass of walls and ruins built up on a hill. The houses are almost all of one or two stories in the city. It must have been a palatial residence, but of whom? No one can tell. Any one coming here with the skill and knowledge of the archæologist and engineer combined would find a rich field for research. Every building, every line of walls, every arch ought to be traced out on a map, and so, as Prof. Louis Agassiz has stated that from a few bones of a fish or animal, or even from its fossil remains, the whole could be completed, the entire construction of the old city might be put together.

You enter the unpretentious door of some dilapidated house, and you find yourself in the midst of broken arches and walls which completely puzzle you. Then, as for the wells, often fifty or a hundred feet deep, they seem to be everywhere, and remind you of those you have seen in pictures illustrating Spanish ballads. There must be several hundred of them here, round, and built of stone; at any rate in the yard behind one house which had evidently been an important mansion, I counted at least six. There are also many cisterns for collecting the rain water, which at certain times falls in great profusion.

In this account of the public buildings no mention has been made of the governor's house, or headquarters, recently used as the palace of justice for the meetings of the Supreme Court. It is quite near the Jesuit convent, now the theatre, opposite the sun dial, and overlooks the river Ozama from the high bluff on which it is built. It has evidently passed through many experiences of official life, and, although to-day considerably out of repair, could easily be put in order and made an available building for many purposes.

It is curious that the best part of the city—that is the strip of land inside the fortifications on the sea front—should not have been taken for the finest residences, but so it is. Where there are now a lot of palm-thatched *bohios*, or huts, occupied by the lower classes, there ought to be a drive-way with handsome houses and villas facing the sea, and doubtless this will come in the future. Here, too, is the place, not far from the lighthouse, for a modern hotel, inside the city limits, so that the various points of interest could be easily reached by a short walk, and at the same time right on the border of the sea, whose refreshing waves would dash up almost under the windows of the building. This coast line continuing outside the city walls, and going westward, is very beautiful, for the formation of the rocks is such that the spray is often in many places, even with a light breeze, dashed twenty and more feet in the air. Not far outside of the city, and passing several country estates, you arrive at an excellent place for taking sea baths, known as la Güibia. A reef some distance out prevents the sharks from coming in, and between it, and where the surf breaks on the second beach, there is ample room for plunging in the waves, and swimming as much as you like. Every morning from early dawn you will find plenty of bathers enjoying a dip in the invigorating salt water.

A mile and a half farther on, or perhaps three miles from the city limits, you reach the detached fort of San Jerónimo in good preservation, and a picturesque object on the coast. It was carefully and solidly built, and evidently intended to prevent any hidden approach upon the city from that direction. It could easily be made an attractive resort with a café in its ramparts, from which the cool breezes could be enjoyed.

It is worthy of note that nearly all the forts or bastions on the walls of Santo Domingo are named in honor of some saint; as, for instance, San Antonio, San Francisco, San Miguel, San Lázaro, San Gil, San Fernando, San Diego, while one of them, Santa Bárbara, is named after one of the fair sex, who in some manner seems to have been associated with military matters, especially with the artillery.

And now, as we are out of the limits of the city proper, we might take a look at what there is to be found of interest *extra muros.* First there would come the famous tree of Columbus, which is between the walls and the river, and which, tradition says, was used in the early days of the place to tie vessels moored in the river. It is an immense *ceiba* tree, with wide spreading branches. If these lines should ever come under the eye of the genial "Autocrat of the Breakfast Table" it may interest him to know that the writer has measured the tree. He found that at ten feet above the ground, or just at the place where the roots begin to grow downwards and the branches to spread upwards, this huge production of tropical nature measures, in circumference, a very little less than thirty feet.

A short half mile up the river, and on the same side, will bring you to the fountain or well of Columbus, a spring of delicious water which bubbles up quite close to the Ozama river, and which has been used from time immemorial for supplying ships with water. A stone building has been put up around it, and it is one of the curiosities of the place.

On the eastern bank of the river, where the town of Nueva Isabela was first founded, nought remains of it but the chapel del Rosario, a small and simple but solid building, which was doubtless the first church erected by the Spaniards here. Near to it and up the hill is the village of Pajarito (little bird), a collection of modern *bohios*, with a church, a building for the alcalde, and all the appurtenances of a small town. To cross the river you go by a ferry, but an iron bridge is now in process of construction by some Americans to take the place of the wooden one put up by Mr. Allen Howard Crosby some years ago, and afterwards swept away by the river's force during the rainy season.

Northwest of the city is the village of San Carlos, with an old church, but little else of interest. Near the Conde gate outside are two cemeteries, one for Catholics and the other for Protestants ; but considering the antiquity of Santo Domingo, one cannot but be surprised at the small number of graves and at their modernness. You ask where were all the people buried in the sixteenth, seventeenth and eighteenth centuries—three hundred years of the life of the place—and there is no answer to your question. Very likely many of the remains have been disinterred and consumed by fire at different times.

The longer you stay here and try to make an historical study of Santo Domingo the more you find it hidden in the mystery of the past. There may be records in the Vatican or in Spain, but here there is absolutely nothing to help you. Tradition, and perhaps history, tells you that about 1495 Miguel Diaz, a young Aragonese who had got into some difficulty with another Spaniard in Isabela, the regular settlement made by Columbus on the north of the island in January, 1494, on his second voyage from Spain, ran away, and, crossing over the land, brought up at last on the banks of the Ozama river. Here he met the beautiful maiden Cacique Zameaca, or Spirit Woven, who was the Princess of the Ozama tribe of Indians. They evidently fell in love at sight, were married, and lived happily for years, until at her suggestion, as she divined that he wanted the companionship of his old friends, he returned to Isabela with a tempting account of gold on the Jaina river and other attractions in the southern part of Hispaniola. His feud with his old enemy, whom he had only wounded, not killed as he had supposed, was made up and he returned with a body of his countrymen. They founded the town of Nueva Isabela and he was its first Alcalde.

But here the troubles of his lovely wife began; for the Spaniards, with their greed for gold, set the natives at the hardest kind of work, for which physically they were not adapted, and treated them almost as slaves. Zameaca, heartbroken at the misery she had innocently brought upon her people, disappeared from the place and was never heard of again.

The date of foundation of Nueva Isabela has been given by different authorities as that of 1494 and 1496, and so I have selected 1495 as between the two, which may be correct. The tower in the citadel of Santo Domingo is called the Columbus tower, and many persons speak of it as the one in which he was imprisoned by Governor Bobadilla, and from it sent in chains aboard one of the vessels and so returned to Spain, where he appeared before the court of Ferdinand and Isabella, and let them decide for themselves as to the injustice of the treatment to which he had been subjected. But this cannot be accepted as the fact of the case, for Bobadilla arrived at Nueva Isabela in 1500, and it consequently must have been from the east side of the Ozama river that Columbus suffered these cruelties and indignities.

Governor Nicolas Ovando arrived in Hispaniola in 1502, and he at once transferred the city over the river to the place where it exists to-day. One reason for this was the spring of fresh water, already mentioned, which was of the greatest importance to the colonists. The building of the city was pushed forward with great activity, and twenty-five years sufficed to bring it into permanent shape. Indeed the years of its early importance and supremacy can be numbered at, say fifty. The discovery by Balboa of the Pacific Ocean, which led to the occupation of Peru by Pizarro with the atrocities of the Conquest, and that of Mexico by Cortés, greatly changed the situation. So later on it happened that the galleons to Puerto Bello on the isthmus of Darien, and the *flotas* to Vera Cruz in Mexico went to and from Spain without making a rendezvous at Hispaniola. Add to this the colonization of Cuba by Velasquez and that of Florida by Ponce de León, and it is easy to see how the supremacy of Santo Domingo came to a natural end.

Meanwhile, also, many of the neighboring and smaller islands of the West Indies were occupied by different European nations, and early in the 17th century the

English colonization of the Atlantic coast of North America, which had been visited by various navigators shortly after Columbus came to the New World, began in earnest. The French had colonized Canada before this.

It was not until Columbus made his third trip across the Atlantic Ocean that he visited the Ozama river and the site of the city of Santo Domingo. In 1492 he founded the first settlement at Navidad in the bay of Acul, not far from the Cap Haitien of to-day, which in reality was little more than a small stockade fort. On his second voyage to the island he found this place pretty much deserted and in ruins, and selected as the site of the new settlement, which he called Isabela in honor of the queen, a spot not many miles to the west of Puerto Plata, also on the north coast. Of this nothing now remains but ruins.

Before his third voyage, Nueva Isabela had been founded by Miguel Diaz, and there Columbus went in September, 1498, having, after his departure from Spain, visited an island to which he gave the name of Trinidad from its form, and also the coast of South America, without, however, knowing that it was part of the mainland. He remained two years at Santo Domingo and the country in that part of the island, including the celebrated Vega Real, or royal meadow, in which there were settlements made by the Spaniards which often gave him much trouble in their management.

Columbus was sent back to Spain in chains, as already stated, by Bobadilla in 1500, and he remained there long enough to plead his cause before the King and Queen, and obtain the justice which was his due. He then began to make preparations for his fourth and last voyage to the Western Hemisphere, but he did not set out upon it until 1502.

He arrived at the harbor of Santo Domingo June 29 of that year, but, by the order of Ovando, was not allowed to go on shore. He continued his voyage in the West Indies, and for the first time visited the coast of the isthmus of Darien, Veragua, and farther north towards Mexico.

This cruise occupied about two years, and, before returning to Spain, he touched again at Santo Domingo, when the same governor, Nicolas Ovando, invited him to land and to remain with him at his house in the city. Shortly after this he returned to Spain and died at Valladolid, May 20, 1506.

Santo Domingo City has passed through many vicissitudes, and has been the theatre of many strange and interesting events, while the beautiful blue water of the roadstead could tell many a tale of naval engagements. Beneath the waves are the wrecks of hundreds of vessels sent there by storms, by striking upon rocks, or by the shots of an enemy.

A few important episodes in the history of Santo Domingo need only be mentioned here. One was the attack and occupation of the place by Admiral Sir Francis Drake, who entered the city January 1, 1587, and took forcible possession of it. He did not remain there long, and was prevented from doing much destruction by the massive solidness of the walls and buildings.

Early in the present century, Gen. Ferrand of France, brought what remained of the ill-starred expedition of Gen. Leclerc, brother-in-law of Napoleon Bonaparte, across the island from Cap Haitien to Santo Domingo. He remained there several years, and was greatly esteemed as a ruler by the inhabitants. War having broken out between France and Spain at the time when Napoleon put his brother Joseph on the throne of Spain, the French contingent found themselves attacked by the Spanish Dominicans, and, after several defeats and the suicide of Gen. Ferrand, those that remained soon left the place, a mere handful, and returned to France.

From the time that the present Dominican Republic came into existence, February 27, 1844, life has been comparatively peaceful and prosperous in that part of the island. The president of the republic to-day, Gen. Ulises Heureaux, is a ruler who well understands the necessities of the situation and the wishes of his people. He is doing what he can to aid the progress of the country, and the reciprocity treaty with the United States of America, recently put in operation, is one of his wisest acts. He has more than a year still to serve as president, and then will be eligible for re-election for another term of four years, after which he must have a successor for one term, when by the constitution of the country he becomes eligible again.

To form a good idea of the many interesting and picturesque sights and scenes in the city there can be no better post of observation than the windows of the hotel Philipot, the former priory of the San Franciscan Convent. This building is on the Calle del Comercio, (Commercial Street,) with the horse cars passing by it, and directly opposite is the principal market of the city. From early dawn until noon, and even later, there is a going and coming of people, at times quite a crowd, and the hum of voices floats in through the hotel windows. The market building itself is modern, and well adapted to its purposes, and to the climate. It is a long parallelogram, with entrances at the sides and ends, and a large open space in the centre. The roof is of corrugated iron, but, like part of the rest of the structure has been painted a Pompeian red, so that there is none of that glare so offensive to the eyes. On the front are a great many stalls with meat hanging up, while between it and the street are two stalls devoted to the sale of fish. You see them there in their iridescent tropical colors, large and small, and many of them are excellent eating.

But it is in the groups of women, some inside the building, and others outside, and squatting about the sidewalk that the artist will find his best studies, to which must be added the various itinerant venders, some on foot, some on the jackass (burro), the horse, and occasionally one quite comfortably astride of a bull. The assemblage is of all colors, from the deepest black to the purest white, and the women, who predominate, certainly on the curbstone, have their bright and many colored turbans to add to the brilliancy of the scene.

Let us take a group and see what they are selling. You will find the many fruits of the country, bananas or plantains, oranges, pine-apples, *caimitos*, part of which has an acid, but not unpleasant taste, while the piece which connects the fruit with the stem can only be eaten dried and roasted with salt, when it is like our roasted almonds, so much appreciated at fashionable dinners. Then there are *nísperos*, *zapotes*, *guandbanas*, mangoes and many others. Other women are selling vegetables, yams, sweet potatoes, tomatoes, red beans, lettuce, radishes, rice, etc., etc., while there is plenty of coffee, cacao and brown sugar, which latter three are probably the most valuable products of the land. To them must be added tobacco, and the sale of this is in charge of a man in the corner of the market. It comes in sticks about four feet long, wrapped up in a tight covering of part of the palm tree, just as it is rudely prepared in the country, and so resembles much a huge Bologna sausage. The man skilfully cuts off a piece for the number of *motors** you may wish to expend, and then, as you examine it, you find it is not unlike in color and strength to the famous perique tobacco of Louisiana. Near to him you will find some pipes for sale made here, and in simple artistic forms, of the clay of the country, while another person yet has the stems to go with them.

But enough of the market and the people in it, so let us look at the passers by. First comes the vender of charcoal, who is astride of his jackass, and has on either side a quantity of small baskets, also made from the palm, and filled with charcoal, which is universally used in the kitchens of the place. After him, perhaps, comes the seller of bread, and he is generally mounted upon a horse, it might be difficult to say why, unless it be that bread is a more dignified article than charcoal, and also because he needs an animal that will take him from house to house more quickly than the donkey. He has on either side of his animal a barrel filled with rolls, which are excellent in quality, and have been from time immemorial made by mixing in equal quantities two brands of flour. Each barrel has a great tin cover, on which the man beats a tattoo to announce his visit.

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* The smallest nickel coin in circulation, one and a quarter cents.

Then there may be a man having for sale the wild pigeons which at certain seasons of the year fly over the island by millions, and are a much sought article of food. There you see a young fellow selling lottery tickets for the next drawing, which occurs regularly every Sunday afternoon, or a boy with a wooden tray on his head, filled with *dulces*, or the sweetmeats which are always in demand, or a girl may have some little pies made of meat, which are very good.

Imagine next a great lumbering two-wheeled cart, coming down to the wharf from one of the neighboring sugar plantations, and turning round the corner by the market. It has always two yoke of oxen, and, at this season of the year, when the roads are heavy from the rain, three, and in addition to the driver, a boy marches ahead of it to give the right direction to the leading yoke. You will occasionally see running in among the groups about the market a small darkey child of say not more than four years, a perfect picaninny, and with just the amount of clothing he had when first he made his entrance into this world. Sometimes he has a hat on his head, nothing more, while now and then some can be seen whose parents evidently believe that the other end of the body is the more important, for the entire costume will be a diminutive pair of shoes.

It is now about ten o'clock in the morning, and we observe a large and handsome black horse, which came from New York, with generally a trig looking young colored man, "Charlie" by name, upon him, who is the head groom of the President, Gen. Ulises Heureaux. He is leading a second horse, also black, but much smaller, to their regular morning bath in the Ozama, which they, like most of the other well-kept horses of the place take, and greatly do they enjoy it. The shelving banks of the river are such that at four feet from the shore they can get into deep water, and even have a swim.

The horse is a very important animal in the island, as, from the want of railroads and ordinary carriage roads, locomotion depends almost entirely upon them. Many, and very good ones, are bred here, while others come from Cuba and Porto Rico. They have that easy, ambling gait which will get you over the road a good many miles in an hour, and which is especially adapted to the tropics, where certainly you do not take a ride for the exhilaration of exercise, but simply as a means of getting comfortably from place to place. It is to be noticed that none of the horses have any shoes, and a farrier could not be found on the island, unless it was a person who had learned his trade in some other place. The horses are very sure footed, and can climb up and down what seem almost impassable roads, as the writer knows from experience, and, as the soil is often rocky, (in fact the city of Santo Domingo is built upon a calcareous soil,) and as, moreover, a lame horse or donkey is a very rare sight, it goes to show that shoes are not a necessity to horses, but, like blinders and check-reins, only a useless and often cruel encumbrance.

Now and then a policeman may pass along the street, and exchange a few words with his friends in the market. These policemen are very neat looking, dressed in a light blue tunic and trousers, with a straw hat, and a belt from which is suspended a weapon, which looks like a sword bayonet or a *machete*. This latter instrument is carried by almost all the males of the middle and lower classes, and it serves for many purposes. They are of various lengths, and are often in ornamental sheaths. They are used to cut a way through the forest, and for this are as skilfully handled as a Maine or Wisconsin lumberman's axe. Again you will see a man with a few clever blows chop off the end of a cocoa-nut, so as to just open it sufficiently to get at the refreshing milk it contains. The machetes come in handy for many household purposes, and are an efficient aid in enabling the native to cut up his food. Hartford, Conn., is the best known place in which they are made, and the famous Collins Co. has doubtless reaped a rich harvest from their sale in every part of America south of the Rio Grande. Though they may give the wearer a somewhat ferocious look, it is very seldom that they are drawn in personal brawls. In fact the people are so peaceful and good natured that the duties of the policemen are very light. You scarcely ever see a drunken man, and this in a place where the question of prohibition is not brought up for discussion, and where the price of rum is so low that in this respect it would even beat cheap American whiskey. The houses of course are open all day, and articles of almost every kind are perfectly safe from the hand of an intruder. The natural instinct of good fellowship prevails everywhere, and laughter and a pleasant greeting in the streets are what you can count upon.

You will be struck with the general neatness of the people, and even the fine clothes of the men and women on Sundays and religious fête days, of which on the average there is at least one a week. Washing clothes, which is extremely well done, forms a lucrative occupation for the women, and not only do they turn out their own light frocks in good form, but the white, gray and blue suits of the men are as well pressed into shape as any New York dude could ask for. There is also a striking absence of extreme poverty, and you are hardly ever approached by beggars in the streets, except on Saturdays, when they are allowed to ask for assistance abroad or at houses, but, as they do not expect more than the smallest sums, a *motor*, which is one and a quarter cents, or double that, or perhaps five or ten cents, it can be seen that half a dollar or a dollar once a week will go a long way. The Sisters of Charity expect a little more, and very properly, for theirs is a noble work which every one is glad to help.

We can now go down the San Francisco street, pass through the Don Diego gate, and see what is going on at the Custom House, and along the bank of the Ozama river. We will meet a good many carts, as this is the principal thoroughfare up to the town, and also horses and donkeys with their respective loads. The ordinary saddle of these animals is peculiar and merits a description. It is of straw or matting and might be likened in its fitting to the back to a *highly* exaggerated McClellan pattern, so well known in our war. *Highly* is not a bad word, for the rear of the saddle is so elevated that it is a wonder how the leg can be swung over it in mounting. On either side there are huge saddle bags, also of straw, and so large that they can contain what would fill a small cart.

Passing through the gate, which, in the early days of the city, was the only one on the water side, we are on the wharf, where there are generally several vessels.

Some of them may be unloading their cargoes of pine lumber from the United States, always in demand here, with flour and the many other miscellaneous articles sent from our country. There are others from Europe, and a busy scene presents itself. The vessels leaving the port have first of all sugar, the greater portion of which goes to New York, with of course the other agricultural products of the island, and then a large amount of logwood, mahogany, lignum vitæ, lancewood, etc. Everything has to pass through the Custom House,* an unpretentious, one storied yellow building, as nearly all the revenues of the government come from the import and export duties ; and then the goods can be stored in an open iron warehouse until put upon the ships, or taken into the shops of the city, as it may be.

Close to the Custom House, and up the river about where the station of the "Santo Domingo Shore Line Railroad" to San Cristóbal is to be located, is a small market, especially arranged for the natives who bring down their produce in old-fashioned dugouts, *canoas*, probably of the same type as those used by the Indians when Santo Domingo was founded on the Ozama. Ten or twenty of them may be laid up on the shelving bank, and a glance at their cargo shows that they bring the simple products of the interior, such as corn or maize, which is very much in demand as forage for the different animals. You will see a boat gracefully gliding down the stream, sometimes propelled by the paddle of one man, or, if it is very long, by two, and well freighted with the corn-stalks with their tufted tops, and then this same mass of green will be transferred to the back of a donkey, and in such profusion that it will almost cover up and hide his diminutive body. Then again there is plenty of sugar-cane for sale which is eagerly taken by the town folks, especially the young, who enjoy the taste, and at the same time find nourishment in its saccharine fibre. Fruits and vegetables abound, and with the shouts and laughter of buyer and seller, and the not infrequent braying of a jackass, there is plenty of activity. The languages spoken are principally Spanish and English, the former that of the natives in all the Dominican part of the island, while in Haiti French prevails. English has come in from Saint Thomas, which has supplied this place with many excellent negroes, as well as from Turk's Island and other points. You will often meet a negro, as for instance the waiter and general factotum at this hotel (Ferdinand is his name), who speaks perfectly well the three languages, Spanish, English and French.

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* Since this was written the Custom House has been improved by the addition of another story, and it was officially re-opened on Feb. 27, 1890, the day of national independence.

The holidays form an important feature of life in the Dominican Republic. There are so many of these, some national or patriotic, and others purely religious, that it can be calculated there are not more than two hundred working days in the year.

The national fêtes are two, February 27 and August 16. This latter date is to commemorate the uprising in Santiago in 1863, the object being to overthrow the Spanish rule to which they had then been again subjected for two years. It took two more years to accomplish this, and the Spanish Governor and the other officials left

Santo Domingo in 1865 and the country again became a Republic. It is noteworthy that this Spanish re-occupation of the country took place during the four years of our Civil War, when we were not in a position to maintain the Monroe doctrine, as it applied to that part of the West Indies.

At both of these national celebrations religious services are held in the Cathedral, the President and his ministers attending, and here is also a reception at the Government building.

CATHEDRAL, SANTO DOMINGO, AND COLUMBUS MONUMENT.

The religious fêtes are so numerous that we should have a calendar of the Church of Rome to follow them, and for a person in business there this is very necessary so that he can tell when he can count upon having men to work. During fête days they are not easily persuaded, even by a tempting offer of pay, to tear themselves away from their devotions or amusements.

When I first arrived at Santo Domingo City, although the carnival was over and Lent had begun, I was surprised to see the masqueraders driving and riding about the city, or on foot, playing their amusing pranks. The carnival was still in its glory, and, on inquiring how this happened to be, I was told that as it amused the people so much, the Government had given permission for it to continue a week or so longer, and the dignitaries of the Church of Rome did not say nay to this arrangement. One of the delights of the boys was to whack each other over the head and back with inflated bladders, but it was done with the greatest good-nature, and they were careful not to indulge in this amusement in the case of meeting persons who had arrived at years of discretion. The streets were full of people in all sorts of burlesque costumes, and huge horned masks, and there would be heard music in many houses announcing a dance, an entertainment in which the natives delight, notwithstanding the excessive heat.

During Christmas and New Year's the holidays continue for a long time, and so also at Easter, when for two days and nights, forty-eight hours, from ten o'clock on Thursday before Good Friday, until about ten o'clock Saturday morning, everything is at a standstill. If you are on horseback and want to pass through a town or village you have to dismount and lead your horse until you reach the country again. But when the bell of the Cathedral peals the glad note of Resurrection on Saturday morning then, like the Princess in the enchanted palace, everything springs into life again. Young men, with their horses saddled close at hand, mount them and rush off in every direction. The horse cars start again, carts are seen in the streets, shutters are taken down from shop windows, and business takes a new lease of life and activity.

The Fête Dieu, or Corpus Christi, which comes on June 20, is one of the most important religious observances. The procession, which starts about seven o'clock A. M., is a curious combination of ecclesiastical and military display. Preceding the Host, which is borne by six priests (a handsome canopy of rich material and under it the Archbishop of Santo Domingo and the Cura of the Cathedral) are members of the Cabinet. It is followed by a detachment of soldiers, all of them negroes, though the officers are principally mulattoes, and they make a good appearance in their tropical white helmets, dark green coats and white trousers. A gun is occasionally fired from the citadel, the band in advance plays, and every now and then a stop is made at one of the outdoor altars erected for the occasion in the streets, where a short service is held.

The fête of St. John the Baptist occurs on June 24, and for this the boys make great preparations several days in advance. They insert in the small end of an ox or cow-horn a quill, and then blowing through it, they succeed in producing a remarkable noise, which they keep up all day and well into the night. In the evening bonfires are lit in the streets, and the youths of the place delight in riding on horseback as near as they can to them, even jumping over the burning embers. It is difficult to discover what all this has to do with the life of "one crying in the wilderness," and whose mission it was to "prepare the way of the Lord."

But the most unique of these different religious fêtes is that of Saint Andrew, which comes on November 30. I went out of my way to enjoy the experience, as otherwise I would hardly have believed it possible in this age During the morning hours you stay indoors behind the shutters of your house, office or hotel, and if by chance you open them, you may expect to be pelted with eggs filled with some kind of harmless colored fluid, or even cologne water. Later in the day the fun consists in throwing down from the house-tops, or rather from the tops of public buildings accessible to the youths of the place, buckets of water, clean water it is true, upon any one passing below on foot or in a carriage. There is no use in getting mad about it, for it is a custom of the place. and if you do not like it you can stay indoors ; but once in the street you must expect the consequences. In spite of warnings, I ventured out, and my umbrella did not prevent me from getting a good ducking, and I was satisfied at this as it enabled me, from personal experience, to tell the story of the day.

There are many other religious fêtes, and often they are held in one quarter of the city only, at a time, for a week or so, and near one of the numerous churches. The streets will then be gaily decorated with bright colored bits of tissue paper suspended on strings from one house to another, and often in addition to the street altars you will see in the windows of the houses any kind of rugs or other draperies suspended, to add to the effect. It all impresses you as a scene of mediæval life that has in some way slipped into the prosaic existence of the money-making electric age in which we live.

Santo Domingo City and the Dominican Republic have, all the same, caught on to this progressive spirit of material go ahead, and, so far as possible, are keeping step to the music of the times.

It is about three years ago that a cable, laid by a French company, put the island in telegraphic communication with the rest of the world.

At the head of Samaná Bay a railroad starts from Sanchez, and has been built by some English, or rather Scotch capitalists, some sixty miles into the country as far as Concepcion de la Vega. Other roads have been surveyed and projected, and on one of them, starting at Santo Domingo City, some work has already been done.

There are now in the Dominican Republic more than fifteen sugar estates, of which fully half are owned and managed by Americans, while nearly all the sugar is sent to New York, Boston and other of our ports.

The cultivation of cacao and tobacco has, during the last few years, been undertaken more carefully than heretofore, while coffee, which grows at will, is only waiting for intelligent planters to produce it in as good condition as anywhere else in the tropics.

Capital and labor, well directed, are all that is needed to bring this enchanted isle, which has been well called "the Black Diamond of the Antilles," into the front rank as a producer of many of the staples of life.

The reciprocity treaty with the United States is already an important factor towards this desired end. Many of the articles they need from us are now admitted free of duty, while they in return offer us some of the products with which nature has so bountifully supplied them.

If arrangements could be made for our Government to lease the beautiful bay of Samaná as a coaling station and naval rendezvous, it would be one more step in the right direction of aiding the good cause of reciprocity and friendly feeling between the two republics.

A CENTRAL AFRICAN RAILROAD.*

BY

H. G. PROUT.

The Greatest Trust between Man and Man is the Trust of giving Counsell.—*Bacon.*

A few weeks ago *The Engineer* (London) published a series of three articles by Mr. W. Wiseman, M. Inst. C. E., on a proposed railroad through British Central Africa. These articles are worth reading as a work of the imagination, but as "Counsell" they lack the first elements—they lack truth, sobriety and judgment. To one who has even a little real knowledge of Africa the ease with which Mr. Wiseman dismisses the appalling difficulties of the problem which he sets would be tragic if there were the remotest chance of his project being undertaken.

The proposed line was shown in *The Engineer* on a map to a scale of about 600 miles to the inch. The map is reproduced here on a still smaller scale, but I advise any one who thinks of putting money into the enterprise to study it first on a map drawn to a scale of 50 miles to the inch. Then it will take on quite a different aspect.

The line shown follows quite closely the parallel of 10° N. lat. from Berbera on the Gulf of Aden, to Lagos, on the Gulf of Guinea. On the same map is shown a line from Siut, in Egypt, right up the Nile valley, to intersect the east and west line at Fashoda, where it crosses the Nile, in lat. 10° N. Fashoda is actually on the west bank of the Nile and not the east, as it appears on Mr. Wiseman's map, but that is a trifle. This Nile Valley line forms no essential part of the immediate scheme, but the great and obvious advantages of connecting the two are incidentally mentioned. The east and west line, which is called the Central African Railway line, is estimated by Mr. Wiseman as about 3,000 miles long. From Siut to Fashoda by the Nile is very near 1,800 miles; but by a railroad line, cutting off the great bends of the Nile, it might be reduced to 1,500 or 1,600.

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* The greater part of this article has appeared as an editorial in the *Railroad Gazette* (New York) of which Mr. Prout is editor in chief. His direct knowledge of the country of which he writes was obtained while he was in the Khédive's service, in command of an expedition of reconnoissance in Kordofan and Darfur, and as Governor of the Equatorial Provinces.

Mr. Wiseman admits that little is known about the topography, climate, products or people of the country through which his railroad, 3,000 miles long, is to be built; but by a very simple process, viz. guessing that the conditions will average much the same as in certain Indian countries with which he is familiar, and assuming a figure of cost per mile and multiplying it by 3,000, he estimates that the Central African railroad will cost £15,500,000 for a metre gauge line and £18,000,000 for a 4-foot 8½-inch gauge. I do not dispute this estimate; but have watched with interest the development of the scheme in *The Engineer*, expecting each week to be told how the enormous difficulties of a preliminary reconnoissance of the line are to be met; how, then, it is to be surveyed, located and constructed, and finally, what interest it will pay on an investment of $90,000,000. The series of articles ended as it began in generalities. Consequently I venture a few observations.

Only the most superficial examination of this line has ever been made, except at the point where it crosses the Nile and for a few miles from the sea at the western end. From Lagos to the proposed crossing of the Niger, say 200 miles, the country is fairly well known. Thence for 500 miles, well into Bornu, somewhat accurate information may be had. Thence, right on to the Nile, say 1,200 or 1,400 miles, the tenth parallel has been crossed by white men only at intervals of 200 to 400 miles, and from the Nile to Berbera, say 1,000 miles, the country is even less known. What may happen in 200 or 400 or 1,000 miles of Africa one may guess at, but no sane man would risk much money or reputation on the guess. To say that in those great, unknown gaps will be found materials for construction, and "teeming millions" ready to work cheaply, and hungry to trade with civilized nations, is not only pure assumption, but is absurdly improbable.

The tenth parallel is just on the border line between the country of the semi-civilized Mohammedans and the naked, pagan negroes. Along this line they mingle, and they flow over it north and south, the semi-civilized prevailing in one longitude and the savage in another. On the whole, the influence of the semi-civilized Mohammedans is dominant enough to have slightly modified the savage conditions immediately along this parallel.

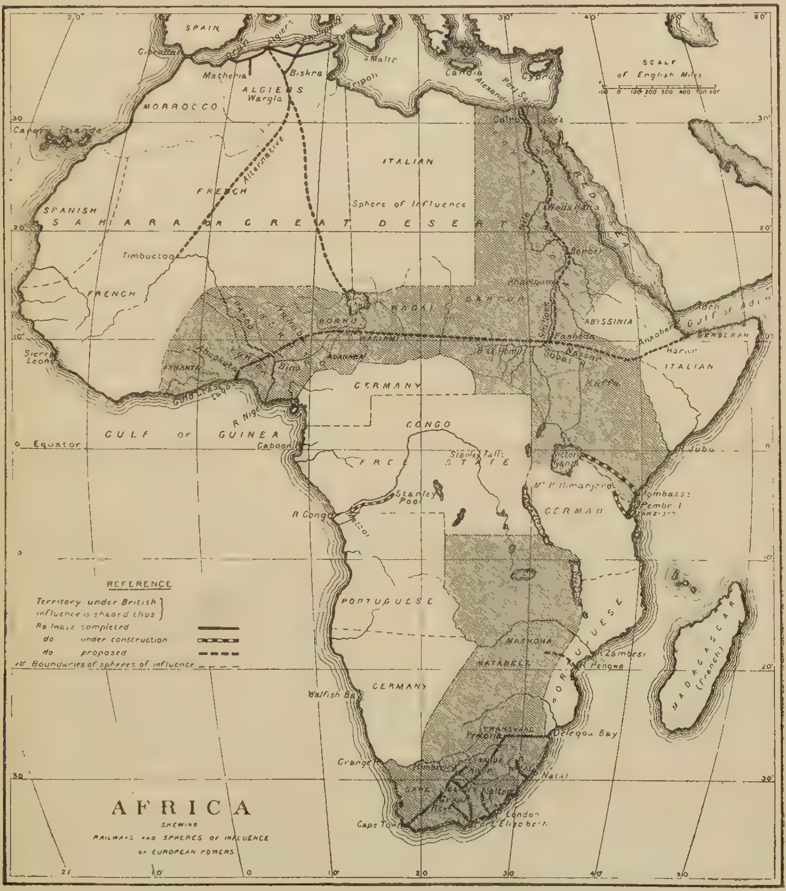
I shall not attempt to speak for the country for 700 miles from the Gulf of Guinea, to the south of Bornu. There a population may exist which is so far advanced that it will help build a railroad and will support it when built. I doubt even this; I am not sure that it would pay to build a road even 200 miles from Lagos. But to build a road from the southern part of Bornu to the Gulf of Aden, say 2,200 miles, would be an appalling and unforgivable waste of money and life.

By very far the greater part of the people are pastoral or agricultural and have few arts or handicrafts. Such as they have are the simplest and rudest. Their agriculture is confined to producing a scanty and precarious subsistence; they grow nothing that would have enough value to stand transportation and they produce no surplus. If scarcity of rain or wars prevent making a crop, there is a local famine. In marches of thousands of miles through the Sudan, I have seen this condition more than once; and we know that the Mahdist wars have been followed by famine so intense that in the great city of Khartum the people have eaten the dead in the streets. The "doorah" and the "dokhn" which make up their breadstuffs, would have no value in European markets even if they ever grow a surplus. The gum arabic, ostrich feathers and other local products which are gathered in the whole zone that could be made tributary to the Central African railroad would not fill one freight train a week; and it would be hard to load even those trains back. People who produce so little that the world wants, and want so little that the world produces, may support a caravan commerce profitable to a good many traders, but from that to a commerce that would support a railroad the step is long.

One of the conditions, which narrow this tributary zone and would add immensely to the difficulty of proper exploration of the route and to the cost of construction, is the lack of local transportation. At the tenth parallel the limit of the camel's usefulness has been passed. He dies south of that line and is a feeble beast on it; consequently he is seldom bred so far south. The people have rarely had the intelligence to train any other beast of burden.

As workmen the people would be worthless and uncontrollable. They are accustomed to the use of no tools but the most trivial digging and cutting implements, and they have the reluctance of all barbarous people to steady work. Nevertheless, Mr. Wiseman says "cheap labor is practically available throughout the entire length of the railway." The only way that it can be had is to *force* the people to work. Perhaps England is ready to do that in the interest of "Christianity and civilization and the English Sabbath"; and we doubt not that it would be a capital thing for the Central Africans to be forced to work; but, as Gordon would have said, "the scandal would be too great." The fact is that those who survey the line as well as those who build it will have to face not only the indolence, the ignorance and the poverty of barbaric people, but often their steady and bitter hostility. For instance, the Nile and its immediate neighborhood at the proposed crossing are controlled by the successors of the Mahdi, and a small force of Europeans going in there would be massacred. This condition would be found for 400 or 500 miles along the southern frontier of the Egyptian Sudan. What would be the temper of the people elsewhere we do not know. The Shillûks who occupy the west bank of the Nile south of Fashoda are naked savages, and Mr. Wiseman is correct in calling them "warlike"; in fact, they have before now defeated more than one expedition of regular troops, and at least once killed the Governor of Fashoda and a battalion or two with him.

For many hundreds of miles, probably for more than half of the route, there is no timber fit for cross-ties. The acacias and other trees, which are common enough, rarely reach six inches in diameter. They make hard forests to work through, but are of no use for ties.



Larger construction timber is almost entirely wanting. But for much of the route timber would not answer even if it were abundant, as the white ants would destroy it. Fuel for locomotives, other than wood, probably could not be found.

Finally, the whole zone is a region of mortal fevers. It is not so bad as the zone of greater rainfall near the equator, but it is worse than the drier regions to the north. There are individual white men who could live for years in this belt ; but, speaking generally, of white men in mass, and of the country at large, a white man cannot live in it five years. One-third of the men in an Egyptian battalion in Darfur died of disease in one year. They were in latitude 13°, where the general altitude of the country is about 2,000 ft., the soil light and the rainfall small. In the swamp regions of the White Nile and Bahr El Ghazal the fevers are far worse than in Darfur, Kordofan or Wadai. Between these extremes lies the line of the proposed railroad. What would be the fate of white men who undertook to build that road or to colonize along it, the reader can judge.

Space will not permit me to discuss a line up the Nile valley from Siut to Fashoda. It is enough now to say that from Wady Halfa south it would have to be preceded by an army of conquest and occupation. When Sir John Fowler, acting for the Khédive, caused surveys to be made for a railroad to Khartum, and for another into Darfur, the construction parties could have had the loyal aid of those brave spearmen who killed Gordon and Burnaby and the two Stewarts, who annihilated Hicks' army, and who, at Abu Klea, came within an ace of wiping out a square of the stanchest infantry in the world. To-day those men would have to be fought —and it is England's fault.

I have said what I have said because it is a man's duty to correct evil and dangerous "Counsell," and not in any spirit of opposition to England's enterprises in Africa. Quite to the contrary, I believe that it is the duty and the policy, and will be the destiny of England, to open up the "dark continent." A proposition so broad and so old can be supported by many reasons, and I shall not take the space to re-state them now; but I have no doubt that England's ascendency in Africa will be for the good of the human race. There is no other people so fit to subdue and control a barbaric land as the English. Any candid man of any race and country must see shining through the history of the extension of the British Empire the noblest and most brilliant human qualities, the highest genius for war and for government, the deepest fortitude and the most patient and persistent common sense. So I have nothing to say against England's occupation of Africa, but wish it God speed. Such an enterprise as this proposed Central African Railroad can only hinder it. Africa is to be conquered, like any other continent, by patient advances on the easiest lines, and not by a *coup de main.*

The railroad from Mombasa toward the Victoria Nyanza is worth trying and is a proper step, but it will not pay for at least a generation to come. So of the German road in from Bagamoyo. It would perhaps pay to start in from Lagos and build to the Niger; then, when trade develops, push on toward Bornu. It would not, however, be worth while to push a railroad up the Nile from Siut. The Nile itself and the existing railroad around the first cataract at Assuan are quite enough for the business to be done. Some day the road must be carried south from Wady Halfa, but that cannot be done now. Finally, when England gets ready to retake the Sudan, as she ought to do some time, the first step is to push a railroad across from the Red Sea to the Nile, say from Suakin, latitude 19°, to Berber. By that route the heart of the Sudan would be within 250 miles, by rail, of deep water. Had this railroad been built years ago, when I examined the country and recommended it, the Mahdi's rebellion would have been crushed before it had fairly begun, a vast land would have been saved from untold suffering, and Gordon might still be doing his noble and beneficent work on earth.

WINSOR'S COLUMBUS.*

Mr. Winsor has brought together in this volume, arranged in lucid order and with characteristic thoroughness, all that is really known respecting the career of Columbus. No source of information, near or remote, has been neglected; and the enormous mass of material has been sifted and examined with great critical skill and, in some respects, with a sobriety of judgment which deserves the highest praise.

The subject is introduced by an enumeration of the sources and the gatherers of them. First in importance are the writings of Columbus himself, ninety-nine distinct pieces, of which sixty-four are preserved in their entirety, twenty-four of them being wholly or in part in his own hand. His letters are all in Spanish, of which, as Harrisse dubiously remarks, he was probably a better master than he was of his native tongue.

Columbus took no great pains to preserve any of his papers except the documentary proofs of his titles and privileges, and these are now in the possession of his descendant, the Duke of Veragua, in Madrid.

Much of the obscurity that shrouds the history of the Discovery is accounted for, as Mr. Winsor reminds us, by the transient character of the fame which it brought to Columbus. It was a later generation that fixed his name in the world's regard.

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* Christopher Columbus, and How He Received and Imparted the Spirit of Discovery. By Justin Winsor. 8vo. Boston and New York. 1891.

There are references to maps constructed by Columbus, but not one, certainly to be attributed to him, is known.

Mr. Winsor has no great hope of any important addition to our information concerning the Admiral from the discovery of documents, now hidden in public or private collections. With regard to Ferdinand's biography of his father the judgment is: "Harrisse's views cannot be said to have conquered a position; but his own scrutiny and that which he has engendered in others have done good work in keeping the *Historie* constantly subject to critical caution. Dr. Shea still says of it: 'It is based on the same documents of Christopher Columbus which Las Casas used. It is a work of authority.'"

Not one of the many portraits of Columbus has a claim to authenticity.

Mr. Harrisse, whose name constantly recurs in this work, has practically settled the question of the discoverer's birthplace in favor of Genoa.

The chapter entitled, "*Was Columbus in the North?*" clears away a deal of rubbish with a firm hand, and Mr. Winsor's conclusion, introduced by the words of Muñoz, *Ignorance is generally accompanied by vanity and temerity*, is as follows: "Whether Columbus landed in Iceland, or not, and whether the bruit of the Norse expeditions struck his ears elsewhere or not, the fact of his never mentioning them, when he summoned every supposable evidence to induce acceptance of his views, seems to be enough to show at least that to a mind, possessed as his was of the scheme of finding India by the west, the stories of such northern wandering offered no suggestion applicable to his purpose. It is, moreover, inconceivable that Columbus should have taken a course southwest from the Canaries, if he had been prompted in any way by tidings of land in the northwest."

Mr. Winsor thinks it is practically impossible to identify the island on which Columbus first landed, but he says: "the weight of modern testimony favors Watling's Island, which so far answers to Columbus's description that about one-third of its interior is water, corresponding to his 'large lagoon.' That this island was Guanahani was first suggested by Muñoz, in 1793."

Capt. Becher, of the British Navy, worked out the argument in favor of Watling's Island in 1856, and he has been followed by Oscar Peschel, by R. H. Major, by Gerard Stein, by Lieut. J. B. Murdoch, U. S. Navy, and by Clements R. Markham.

Three hundred pages of the book,—(pp. 178–476)—, are devoted to the story of the agreement with the Spanish sovereigns and the account of the Four Voyages.

It is here that the reader loses confidence in Mr. Winsor's impartiality.

Every incident that can be made to tell to the disadvantage of the Admiral is brought out in strong relief, while the suggestions favorable to his character are dismissed as the work of the "Canonizers," who seem to ride Mr. Winsor like so many nightmares. A few examples are enough to illustrate this uncritical temper. Martin Alonso Pinzon's disloyalty to his commander calls forth no comment, while on the other hand, Mr. Winsor repeats more than once the charge that mere greed of money moved Columbus to claim the slight reward offered by the sovereigns to the person who first sighted land. The other claimant was a seaman on board the *Pinta,* Martin Alonso Pinzon's vessel, and it was well known that the spirit of that captain had made his crew ripe for insubordination. Columbus believed that he had seen the light on the land, and he insisted on the reward. "To renounce the prize," says Mr. Manrique,* "was not simply to give up to another a trifling sum of money; it was, in fact, to resign a glory justly deserved. . . . It was to leave the door open for any underhand plot that might be contrived on board the *Pinta,* from which vessel the cry of 'Land!' had first been heard, a plot that would have brought with it the diminution of his prestige as a mariner and, above all, as the commander of the expedition. . . . A man in his position was bound at every hazard to take care that the crew of the *Pinta* should see Martin Alonso, their captain and fellow-countryman, in his true light as nothing more than an officer, who had to receive his orders from Columbus (p. 206)."

Prescott is charged with an obdurate purpose to disguise the truth because he speaks of the noble character of Columbus, and appends in a foot-note a reference to the illegitimate son. It is to be inferred that Mr. Winsor thinks it more noble to abandon than to recognize such a son.

It is implied that there was something very bad in

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* Granahaní. Investigaciones Histórico-Geográficas sobre el Derrotero de Cristóbal Colón por las Bahamas y Costa de Cuba, etc., por Antonio María Manrique. Arrecife (Canarias), 1890.

Columbus because men were not attached to him. Who, excepting Lafayette, showed any attachment to Washington? Columbus, we are told, was guilty of chicanery because he did not take his sailors into his confidence; but what commander does this? The deceits practised during the First Voyage mark, in Mr. Winsor's mind, the beginning of a decadence which ended in hallucination or insanity.

In his summing up Mr. Winsor has the air of a man with a mission to write down Humboldt and Prescott and Irving and Roselly de Lorgues, and all the rest. He is not satisfied to take Columbus as a man, equally compounded of good and evil; he refuses to see anything but the low aims, the selfishness, the immorality and the cruelty of the Discoverer, who has been regarded for four centuries as a demigod; and his peroration has a certain impressiveness:

"Hardly a name in profane history is more august than his. Hardly another character in the world's record has made so little of its opportunities. His discovery was a blunder; his blunder was a new world; the New World is his monument! Its discoverer might have been its father; he proved to be its despoiler. He might have given its young days such a benignity as the world likes to associate with a maker; he left it a legacy of devastation and crime. He might have been an unselfish promoter of geographical science; he proved a rabid seeker for gold and a viceroyalty. He might have won converts to the fold of Christ by the kindness of his spirit; he gained the execrations of the good angels. He might, like Las Casas, have rebuked the fiendishness of his contemporaries; he set them an example of perverted belief. The triumph of Barcelona led down to the ignominy of Valladolid, with every step in the degradation palpable and resultant."

The rhetoric and the antitheses of this passage have one grave defect; they do not carry conviction. Mr. Winsor's sincerity is beyond question, but he ignores what he cannot be supposed to have overlooked. It is he who insists upon trying Columbus by the standard of a demigod in order to degrade him below that of a man. If Prescott and Irving have gone wrong through sentiment, Mr. Winsor's narrow sympathies and lack of imagination make him no more than a blind guide.

It is a begging of the question to say that the discovery of America was a blunder. Columbus set out to reach the Indies by sailing to the west, and he came upon unknown lands which lay directly in his course. He would have reached the Indies, had there been no America.

It is not quite clear what is meant by the assertion that Columbus might have been the father of the New World, to which he left only a legacy of devastation and crime.

Justice, if it is not a name, requires that Columbus be made to bear the burden of his own sins and shortcomings, without being held responsible for those of his successors, or his biographers. Mr. Winsor will not admit that the spirit of the age affords any palliation for the wrongs which Columbus perpetrated. He has a right to read history in his own way; and other men have the same right. The fifteenth and sixteenth centuries were a cruel time. The Christians were fierce and bloodthirsty and treacherous in their relations with each other, and they looked upon the unbelievers, whether Jews, or Mohammedans, or Pagans, as beings not within the pale of humanity. Knowing this as well as other men know it, Mr. Winsor returns again and again to the subject of Columbus's cruelty, and contrasts with it the benevolence of Las Casas, whom he takes for the representative conscience of the period. Las Casas was a good man, who deserved his appellation of the "Apostle to the Indies"; but he also was a man of the sixteenth century, and the Father of African Slavery in America. If Columbus left a legacy of devastation and crime, what is to be said of Las Casas?

A true account of any life is an impossibility, for a man does not really know himself, and others never see him as he is; but it must be felt that the instinctive traditional veneration of mankind for the high qualities, which produce great deeds has created an image of Columbus, more nearly like the man than Mr. Winsor's unfaithful picture.

The Appendix, on "The Geographical Results," is a masterly review of the voyages from the time of the discovery to the year 1850, with their successive additions to the knowledge of the mainland until, at last, the configuration of the whole continent stood revealed.

Numerous reproductions of maps and portraits add to the interest of the work. There are, however, too many mistakes in the foreign names. Some of these, such as *Jañez* for *Yañez*, *Mogues* for *Moguer*, *Escoveda* for *Escovedo*, are uncorrected errors of the press; but "*Lorette* in the papal territory," for *Loreto*, belongs to the author, and the name of the younger Pinzon's vessel, the *Niña*, is misspelled *Nina* throughout the book.

ERUPTION OF BÓGOSLOV.

The following notes by Capt. C. L. Hooper, of the U. S. Revenue Steamer *Corwin*, kindly contributed by Professor Davidson, were received too late for the BULLETIN of September 30, but have lost nothing by delay. The sketches, plan and measurements, referred to in the extract, are now in the hands of Prof. T. C. Mendenhall, Superintendent of the U. S. Coast and Geodetic Survey, who himself visited the island in August, and is putting his observations in order.

Bógoslov is in the Bering Sea, in latitude 53° 57′ N., Long. 168° 00′ W.

EXTRACT OF LETTER FROM CAPTAIN C. L. HOOPER, COMMANDING U. S. STEAMER *Corwin*, TO PROF. GEORGE DAVIDSON, PRESIDENT GEOGRAPHICAL SOCIETY OF THE PACIFIC.

U. S. REV. STR. *Corwin*,
ST. PAUL'S ISLAND, BERING SEA,
July 13, 1891.

PROF. GEORGE DAVIDSON.

My Dear Sir : . . . I spent one-half a day at Bógoslov. Made a landing, got soundings, vertical and horizontal sextant angles, sketches, photos and some of the rock, on July 6th.

The island has changed very much since last reports. The connecting neck of land has sunk, also Sail rock, and there are now two separate islands, with deep water between them. I enclose a sketch showing view, plan, etc., and a memorandum with some measurements, which are approximately correct, or were when they were taken.

The new Bógoslov continues to steam and splutter. It is more in the nature of a geyser than a volcano. It has no real crater, nor does it discharge lava and cinders. It is white in color, very dense, emits a disagreeable odor, and shoots out as if under pressure, from every crevice of the rock, the whole uniting in a great volume, and rising to an immense height in calm weather. We distinctly saw it like a white cloud at a distance of thirty miles. The top of the island is seldom seen, being always enveloped in this cloud of steam or smoke. The highest point of which I could get a definite altitude was 221 feet, although I several times caught a glimpse of a peak that is much higher, as the smoke was blown away, exposing it to view for an instant.

I send you some samples of the rock which seems soft and easily destroyed. The island is weathering away fast under the continued influence of the weather, the sea and the internal heat. Great masses of rock break away from the top and sides, and fall, breaking into fragments at the foot where the action of the sea grinds them still finer. Wherever the rock is sufficiently cool, the plucky little Murre deposits her huge green-mottled egg upon every projecting point until it resembles a gigantic incubator. As we approached the island within the distance of a mile, the temperature of the sea-water rose from 44° to 48°. I regretted not having self-registering thermometers to get the temperature at the bottom and at different depths.

The old Bógoslov was covered with birds of the sea, and on the beach a herd of sea lions gazed at us with the utmost indifference until a shot from a 20-pounder went over them, and struck the perpendicular side of the island, bringing down many tons of it; when in their wonderfully awkward style, which resembles nothing so much as a "sack-race," they made good time to the water, and all went in in a heap, roaring, tumbling and fighting. The sun came out for about a minute, and I got two sets of altitude for time, which place the islands about six miles west of their position on the chart. Although the sights corresponded very closely, I have not sufficient confidence in them to report it as a fact. . . .

With kindest regards,
I am very truly yours,
(Signed) C. L. HOOPER.

THE CLIFF DWELLINGS OF THE CAÑONS OF THE MESA VERDE.

BY

W. R. BIRDSALL, M.D.

The Mesa Verde, in whose cañon cliffs and caves an ancient race have left their architectural remains, is a plateau in southwestern Colorado and New Mexico. Its boundaries are roughly defined on the east by a ridge or so-called "hog's-back," which slopes toward Cherry Creek and the Rio La Plata, on the south by the erosion valley of the Rio San Juan, on the west by the erosion district beyond Aztec Spring Creek, and on the north by the Montezuma valley, or plain; properly, the McElmo valley. It rises from 1,000 to 2,000 feet above its base, which has an altitude above the sea of from 7,000 to 8,000 feet. The Cañon of the Rio Mancos completely divides this plateau into two unequal portions, as it extends first southward, then southwestward, and finally in a more westerly direction, leaving to the southwest an irregular quadrangle, whose area is probably about 300 square miles. It is to this portion that special attention is called, as it was here that the writer's observations on cliff dwellings were chiefly made. Its drainage is toward the Mancos, and erosion has produced such an extensive system of cañons through it, that it is now the mere skeleton of a mesa and a perfect labyrinth of gorges. Each of these lateral cañons of the Mancos has its branches and their subdivisions, which extend in many cases almost to the great northern wall of the mesa that faces the Montezuma plain; so that the whole interior consists of a series of tongues of flat-topped mesa, green with scrub-oak, piñon and cedar, running out from a rim or base upon its northern border, forming partition walls of varying width between cañons of enormous depth, whose yellow sides rise perpendicularly from the steep-sloped talus at the base. Huge promontories of rock jut boldly out where cañons subdivide, some carved into strange fantastic forms, others squarely built as if abutments for giant bridges to span the chasms which they limit. The views seen in journeying through these cañons, while ever varying in minor details, soon become monotonous from the continued repetition of the greater features. We pass promontory after promontory, cañon after cañon, which so much resemble each other that the mind, failing to keep the preceding variations before it, becomes bewildered and fatigued. Again, the mesa, to the uninitiated, is a perfect maze; so great are the resemblances between the different branches of the cañons and between the promontories that separate them. From some point of view whence a great area of the mesa can be overlooked, it appears as if the earth had been split into innumerable fissures, as the eye courses over the indistinct outlines of cañon beyond cañon in the distance.

These cañons are all the work of erosion in horizontally stratified rocks of cretaceous formation, chiefly sandstone. The upper strata form an escarpment of yellowish sandstone, harder than the lower strata and about 200 feet in thickness. Directly below it are much softer sandstones and shales which have eroded more rapidly in some places than others, giving rise to shallow caverns or galleries formed by the overhanging cliff of harder rock as a roof; while lower strata, that have also been resistant, form the floor, which is usually much narrower than the roof, varying from a few feet up to fifty or sixty, while the overhanging cliff may project from a few feet to more than a hundred beyond the back wall of the gallery. Below, the wall of rock drops off abruptly, or by an irregular series of narrow ledges, for hundreds of feet down to the talus slope. The height of the galleries above the bottom of the valley varies from 500 to 1,500 feet. They vary in size from mere niches of a few cubic feet capacity to galleries more than a thousand feet in length and fifty feet in height and width.

On these narrow ledges, at these dizzy heights, under these overhanging walls, the cliff-dwellers fastened their houses of stone to the rocks like so many swallows' nests. The question is often asked: Why did they build so high? They built where they found caverns in which to build. Although lower strata exhibit many of these caverns, they are far less numerous and extensive than those under the great escarpment rock.

The cañon bottoms are cut up with the "wash" of former streams, benches have been excavated in the talus, and innumerable lateral *arroyos* intersect the longitudinal stream-beds. Partially disintegrated masses of rock add roughness to the view. Tall, coarse grasses, rushes, sage-brush, tangled vines, willow and cottonwood, make up, chiefly, the vegetation of these bottoms; while upon the higher slopes and ledges, the scrub-oak grows in such profusion that some of these cañon walls at a distance appear richly clad in verdure. Indeed, it is this bright-leafed oak, rather than the darker piñon and cedar of the mesa proper, that gives it the verdant appearance which must have suggested the name "Mesa Verde."

These cañons end mostly in amphitheatres which were favorite sites for cliff-towns. In some, the mesa level was reached by a series of benches and intervening slopes, while others slope gradually to the mesa, or produce a valley in it. Some of these valleys extend so far to the north that they give to the northern face of the mesa a serrated appearance. Few cañons have water in them except after showers or the melting of snow. The waters of the few permanent streams are alkaline and usually unfit for man or beast to drink. A spring is a treasure rarely found in the cañons, but hollows worn in the rocks become filled by rain or melted snow and furnish the chief supply to the traveller upon the mesa. Some of these rock excavations are quite large and receive the name of "tanks."

It was the writer's good fortune to visit the region thus briefly described under the guidance of Richard, Alfred and John Wetherill during the summer of 1891, for recreation rather than for the purpose of systematic archæological study. For several years these men have devoted a great deal of time to the exploration of this region in search of cliff-houses and the relics they contain ; although not professed archæologists, they have amassed a very large collection of the remains of the cliff dwellers and are in possession of a vast number of observations and facts concerning them. Indeed, no one knows this part of the Mesa Verde as they do. The upper end of the Mancos Cañon is the usual place which tourists visit to see a few examples of cliff-houses, and the hospitable Wetherill ranch is the proper outfitting place.

Jackson and Holmes, whose contributions constitute almost the only attempt at scientific literature on the subject of cliff dwellings, described the ruins in the Mancos Cañon, but their observations did not extend to the interior region described in this article. In these branch cañons of the Mancos, however, the ruins are far more numerous than in the main cañon ; a discovery of the Wetherills, who informed me that they have examined between 200 and 300 villages or separate groups of houses, in an area of less than twenty by forty square miles. The greater part of these are in the lateral cañons. This region, now so desolate, was once a well-peopled area. While journeying in the saddle through the Mancos Cañon or its wider branches, occasionally, mounds are met with, many strewn with bits of pottery others exhibiting upon slight excavation the remains of adobe or stone walls, some quadrangular, some circular. The base of a distant cliff may reveal a small water-worn recess showing the remains of a wall of stone which closed it in front ; the so-called "cave houses." Looking along the high cañon walls in search of cliff-houses, the inexperienced observer is apt to look in vain. He sees every variety of shade and color in the great yellow and brown rocks, projecting masses of every form, shadows of overhanging cliffs and the dark recesses below them ; but until he has become familiar with the somewhat paler yellow of the artificial walls and their rectangularly notched appearance, he is apt to pass them by even after a careful search. On spying one of these structures a thousand feet or more above, the problem asserts itself: How did the occupants get up to them? It is finally resolved by the answer: They did not, they came down to them from above. The level mesa top was within one or two hundred feet of them; the cañon bottom perhaps more than a thousand feet below, hundreds of which might be perpendicular or unsurmountable. When built at lower levels, or at the end of a cañon where the slopes permitted, paths and steps leading below are occasionally found, but in most instances the path and steps lead from the house up to the mesa, not down to the bottom. The explorer must adopt the same method if he would work to advantage. He must reach the mesa somehow, and establish himself there as his base for operations. It is only at a few favored points that it is possible to reach the top from the cañon below; such places may have been known to the ancient cliff-dwellers, they certainly are known to the Navajoes and Utes, whose trails here and there serve to indicate a way to the top. Some broken down promontory usually affords the conditions. Zigzaging across the talus slope, the ledges are finally reached, and the horseman is glad to leave the saddle and lead or drive his pony over the rough and nearly upright path, around bold promontories with but a narrow ledge for a footing and across great fissures, forcing him to jump from ledge to ledge. The top reached, the saddle resumed, then comes a ride across the level or rolling mesa at better speed. Dodging under and around the branches of low piñon and cedar trees which form a sparse forest, clattering every now and then over mounds strewn with pottery—the mesa burial grounds—in time a place for camping is reached. It must be where water can be had. A natural excavation in the rock, to which led a gullied slope that directed water when it rained, held a few barrels of muddy liquid and served us at one of our camps. Leading down to it were well worn steps cut in the solid rock.

In hunting for cliff-houses from the mesa, some projecting point will furnish an outlook up or down the cañon and may expose to view some group of houses. To find the way down to them is a matter, often, of careful searching. Usually at some point of depression where the ledges are broken, a narrow way will be found. Yet, there are instances where a broad and royal path sweeps down around the half circle of an amphitheatre to the ledges on which the town was built. Though steps and niches cut in the solid rock are frequent, examples of a regularly laid stairway are rare; we observed one, however, consisting of fifty or sixty steps, each formed of a heavy block of stone, so well placed that they have resisted the ravages of time better than the walls of the large cliff-town to which they led, now almost completely demolished. Sometimes the houses are absolutely inaccessible; portions of the cliff have fallen, ledges have crumbled away, cutting off all access to what may have once been an easily reached dwelling. Ropes and poles are useful accessories to the explorer if he has the courage and the skill to use them. Fragments of notched poles and other ladder-like arrangements have occasionally been found, which probably made many places accessible that are now out of reach. Sometimes it is necessary to let one's self down for a considerable distance through great fissures. In the side walls, niches are often found to facilitate the descent and ascent. Again, the only way is over the sloping or rounded face of some smooth rock, here also, niches for the hands and feet are not unfrequently seen. They are not deep, perhaps the rock has worn and left them shallower than when first cut, yet they give a foothold, though it be a perilous one. The path may be continued by narrow ledges a few inches in width where the side wall must be closely hugged to maintain equilibrium. Then, possibly a succession of giant steps to lower ledges intervene, and finally, as we round a point, a great cliff curves upward and under its deep shadow, on the ledges below, rise the ruins of a cliff-town.

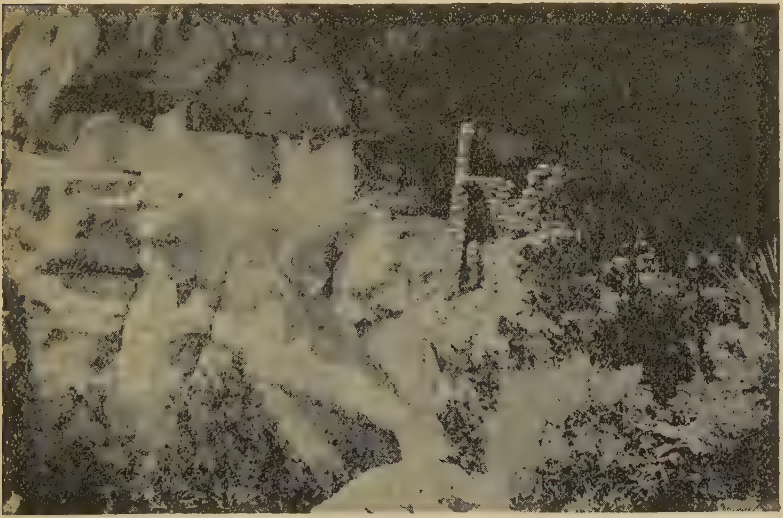

FIG. I.

No description of a single cliff-house can give a correct idea of them as a class, so greatly do they vary in size, form and location. As in every community we have many grades of architecture, from the hovel to the palace, so here, we find a great range in the different features of construction; from the little "cubby-hole" walled up in a corner of the rocks, to the remains of what appears to have been a stately tower or an extensive communal house. Yet all have certain features in common. They are built of blocks of sandstone broken or cut in regular shapes, laid in a cement of adobe and chinked with small fragments of stone. The rock material used was that of the adjoining cliffs, large masses of which fallen from above were usually at hand and sufficiently soft and fragile to have been easily worked with the stone implements found in the houses. The blocks of stone vary greatly in size, though many walls are faced up with stones about a foot long, eight inches wide and six inches thick; others are double or triple this size, some are cubical in shape, while in many of the inferior structures the pieces of stone are irregular, of many sizes and shapes, with adobe plastered into the interstices to fill out the deficiencies. In the more perfect and substantial buildings, however, the walls exhibit great regularity of form and compactness of construction with as true a face as is shown by many of our modern stone buildings. The lines are usually plumb, the corners are turned at perfect right angles in squarely built houses, while in round structures the circles are quite perfect. A remarkable degree of skill is shown by the manner in which the shapes of the buildings were adapted to the limitations of space, which the galleries presented and in the utilization of every available surface. Many of the walls of large buildings rise directly from the extreme edge of the ledge, sometimes even when the slope to the front was considerable, yet so thoroughly were they laid, that many of them stand today on these apparently unstable foundations in a good state of preservation. Where curves in the gallery existed, the walls were also curved or angled to utilize all the space.

FIG. 2.

In some of the more spacious caverns a continuous corridor was left in the extreme rear, allowing communication between the separate apartments. On narrow ledges, the partitions were carried directly back to the cliff walls and up to the roof of the cavern, provided the latter was not too high. Four stories upward from a single ledge was the highest that came under the writer's observation. As the stories are low, from three to six feet, it is not usual to find walls running higher than twenty or twenty-five feet; ordinarily they are not so high. When a lower ledge existed in front of the main gallery ledge, it was often built upon and the walls were carried up to the level of the latter and sometimes above. As these outer structures have not stood as well as the inner ones, it is not possible to say from their ruins how high they were built. When supplementary ledges existed high above the main floor, these narrow projections were often utilized, small compartments being built upon them, too diminutive for human occupation and possibly used for storage. Fig. 1 exhibits such structures built on narrow sloping surfaces below.

The openings in the walls consist of peep-holes a few inches square, windows, and doors. The windows are not numerous, many rooms being entirely without them, while sometimes they are absent from the front walls of an entire village. They vary in size and shape, 18x24 inches being a large size, 12x14 inches a more common proportion. The sill consists of a single flat stone, the lintel of stone, or of one or two small cedar poles to give support to the wall of stone above. The doors have similar lintels, but the door sill is frequently absent. The size of the doors is also quite variable; they are almost always small, many requiring one to enter on hands and knees, and being barely wide enough to admit an adult person. Not an uncommon size is 2x3 feet. Yet doors five or six feet in height and of ample width are met with in some houses. Some rooms have neither doors nor windows in the side walls, being entered through a hole in the roof—or floor of the next story. These roofs and floors are formed of cedar or piñon poles two to four inches in diameter, some of which were allowed to project a foot or two beyond the outer wall. They show that they were cut off with some blunt instrument, probably the stone axe. These larger poles were covered with smaller cross sticks, which were in turn covered with adobe cement; sometimes corn-stalks and strips of bark were pressed into the adobe while it was yet soft, as these articles are still found imbedded in it. Over this vegetable matter a series of layers of brown and black dirt is often found; whether originally placed there, or the accumulated filth from long occupation, is uncertain.

The floors between stories have usually fallen in, leaving the broken poles or the holes in the wall through which they protruded. The main walls of the buildings are from one to two feet in thickness, the partition walls somewhat thinner. The size and shape of the rooms vary greatly. They are usually small, 8x10 feet being a large room, 6x6 feet a more common size, while great numbers of little compartments about 3x4 feet are met with; sometimes they are nooks and corners left in completing the larger outlines of the building. The diminutive height of the rooms is also noticeable, four feet being a not unusual height. In the shape of the inner rooms less care is shown in their proportions than in the outer walls; the partitions being frequently out of parallel. The inner surfaces of the walls, in some cases, were simply chinked and the interstices plastered like the outer wall; many of the rooms, however, are smoothly plastered within, and impressions of the fingers and the palmar surface of the hand are occasionally visible. Finger marks are often found in the cement on the outer walls, and their small size has led some to infer that this was woman's work. The plastered walls have in some instances been smeared over with tinted clay of either a brownish or a pinkish hue. Mural decorations are exceedingly rare. A band in black around the upper part of the room has been observed, and occasionally rude attempts at sketching the human figure. Pegs of wood and staples of bent willow or reed let into the wall, are frequently found and probably served as projections on which to hang things. A special description is required of the circular rooms called "Estufas," from their resemblance to the circular chambers of this name found in the Pueblo towns. One or more of these structures are to be found in almost every collection of houses. They vary a good deal in size and manner of construction, but are always circular, with somewhat heavier walls than those of the adjoining buildings. They have few apertures. A diameter of eight or ten feet is not unusual; much larger ones have been described, but still smaller ones are met with.

Fig. 3 exhibits the ruins of one of these structures, showing a projecting ledge or seat interrupted by a solid mass of masonry. Frequently rectangular recesses exist at intervals in the wall large enough to contain a person sitting with bent knees; smaller recesses are also found. Fig. 3 shows one of them and also exhibits a smoother portion of the wall covered with plaster, as well as surfaces from which it has scaled.

These estufas were usually more perfectly plastered and tinted than the other class of rooms.

In the centre of the floor a shallow circular basin of baked clay from one to two feet in diameter, forming a solid part of the floor, represents a fire-place ; at least fragments and dust of charcoal are found in these basins. Some of the estufas have an aperture about a foot square, opening on the outer wall and screened within by a little wall of masonry built up from the floor about a foot or two from the wall ; whether this was to prevent persons outside from looking in, or for the purpose of distributing the draught, on account of the central fire-place, is uncertain. The interior walls of estufas are usually much blacker from smoke than are the other rooms. The entrance to these apartments is

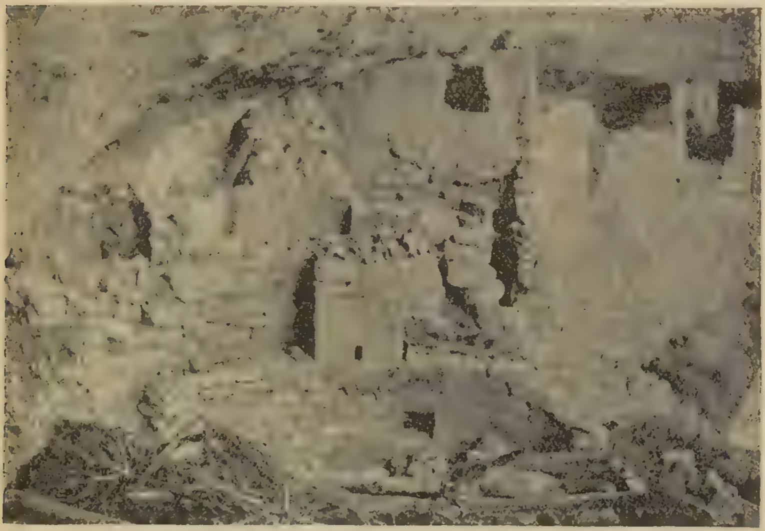

FIG. 3

sometimes difficult to discover; narrow subterranean galleries have been described by some writers, but roof openings and apertures high up in the walls were more common. A form of wall construction should be mentioned in which the wall is continued upward upon a few tiers of stone by wicker work, heavily plastered inside and outside with adobe. Concerning the number and grouping of the rooms in different villages as indicated by the ground plan, it may be said that they range from small collections of half a dozen compartments to those with more than a hundred. Richard Wetherill discovered an unusually large group of buildings which he named "The Cliff Palace," in which the ground plan showed more than one hundred compartments, covering an area over four hundred feet in length and eighty feet in depth in the wider portion. Usually the buildings are continuous where the configuration of the cliffs permitted such construction. Many towns present the appearance of having been added to from time to time, as the wants of the community increased. This is suggested by the different degrees of perfection in the masonry of adjoining buildings and by the better or poorer construction of upper stories. Isolated buildings are occasionally met with. Some of these, situated on spurs or promontories which overlook the valleys, have been regarded as towers of defence, or points of lookout. The valley ruins also exhibit the remains of large isolated round structures, sometimes with a double circular wall, and in the broad valleys are ruins with larger groups of apartments than those in the cliffs, showing a greater resemblance to the Pueblo towns. They probably represent different periods of architecture and were possibly the work of different tribes.

Within the cliff-houses, under the débris of fallen walls and in the refuse heaps about them, various articles have been found which throw further light upon the habits of the cliff-dweller. They may be enumerated and classified in the following manner. Those marked with an asterisk did not come under the writer's observation or verification. For their description and identification Mr. John Wetherill is the informant, and his careful observations may be regarded as trustworthy.

Implements for War and the Chase:—Bows of wood;* sinew bow strings;* arrows of wood and of reed; flint and bone arrow points; flint and bone spear points; flint and bone knives, of various sizes; buckskin quiver with arrows;* snow shoes.* Bows and arrows were found by the Wetherills in a sealed room beside the skeleton of a man dressed in a suit of fringed and tanned skins.

Tools for Building:—Stone axes, polished and unpolished, of various sizes, shapes, and materials, chiefly of igneous rock. Fig. 4 exhibits one with polished edge, 6x3 inches; stone hammers large and small. Both axes and hammers are frequently found with a short handle of wood bound to the stone by strips of yucca.

Implements for the Manufacture of Domestic Articles:—Sticks about three feet long, knobbed at one end and worked into a blade at the other, supposed to have been used in beating and preparing the yucca fibre, as they have been found in rooms with bundles of yucca in different stages of preparation.* Awls of turkey bone; bone needles;* flat and rounded stones for shaping pottery; clay for pottery;* flat hide scrapers; sharp sticks and paddle shaped pieces of wood thought to be agricultural implements; sticks supposed to be part of a loom.*

HOUSEHOLD UTENSILS.—Knives and spoons of bone; stones for grinding corn (metate stones); hoppers of

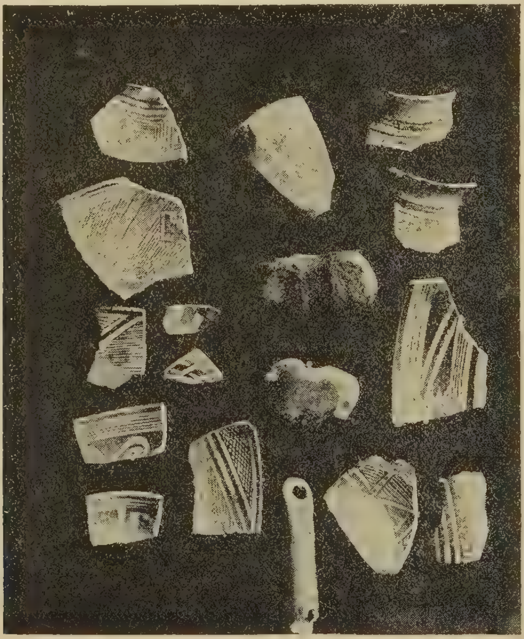

FIG. 4.

woven yucca; stone pestles; sharp pointed sticks for starting a fire;* tinder of bark and of grass; baskets and fragments of basket work made of grass, yucca, rushes, reeds and willow. Baskets shaped for the back have been found with a harness of yucca rope and hide.* Matting of rushes (see Fig. 5) and matting made of willow osiers perforated at short intervals by small awl holes, through which yucca strings pass, holding them together and parallel. Rings of yucca and of rushes to support unstable pottery; the yucca plant in different stages of preparation for fibre; yucca rope, both twisted and braided forms, cordage, twine and thread; flat boards, supposed to be "baby boards." One was found with a bed of corn tops on it.* Small bundles of stiff grasses tied in the middle and cut off squarely at both ends; said to be used to-day by the Moquis as hair-brushes or combs.

Dress and Ornamentation.—Fragments of tanned hides bound with cordage of yucca fibre; fringed buckskin garments; leggings and cloth made of human hair; cotton cloth; cotton cord; yucca fibre cloth; finely woven bands of yucca fibre; socks made of yucca fibre; sandals of yucca with various styles of finish. Fig. 5 shows one exhibiting the heel and toe bands. Some sandals have an in-sole of corn husks, or of soft bark fibre. Feather Cloth: this peculiar textile was made by splitting off the downy part of feathers and wrapping the thin layer of quill around a yucca string, a feather cord as large as one's finger is thus formed, and this interlaced and tied together answered for a mantle, such garments having been found as a wrapping for the dead. Bone beads; snail shells perforated for stringing; jet and stone ornaments have been found.

Pottery.—Large jars holding from one to several gallons, the so-called corrugated ware (indented ware, coiled ware). Fig. 5 exhibits in the largest fragment a specimen of this peculiar pottery; small jars are made of the same material, and their shapes vary. Much speculation has been indulged in as to how they were made, some maintaining that they consist of strips of clay coiled spirally and indented with the finger-nail; others think that this effect is due entirely to nail indentation. As proof that the nail was used for indenting this ware, the writer has a fragment on which the delicate lines of the skin have been perfectly impressed below the nail marks. The inner surface is smooth. These jars are usually blackened from smoke, as if used for cooking utensils. They are of a coarser material than the smooth pottery, but comparatively thin, considering the size of the jars. Of smooth pottery a great

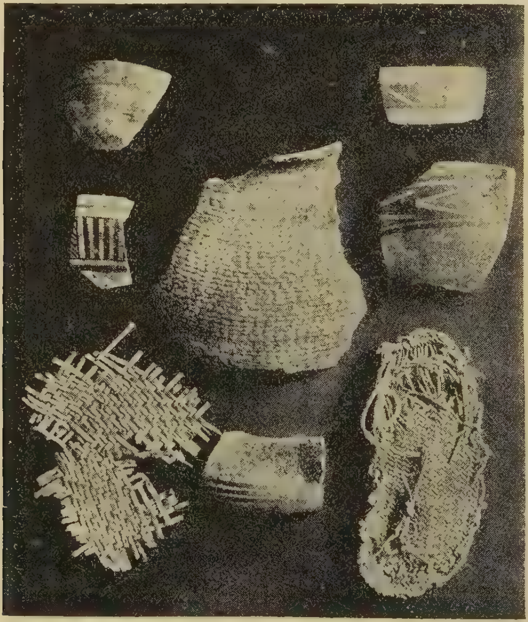

FIG. 5.

variety has been found ; jars large and small, jars with rims for lids, jar lids, jars with side handles, jugs, large and small, pitchers, bowls, mugs, ladles (see handle of ladle, Fig. 4) ; peculiar little pieces of pottery in which cotton wicking has been found, supposed to be lamps.* Some of the pottery is unglazed and undecorated. The surface of the decorated pottery has a slight glaze upon it, which is in some specimens slightly absorbent. Figs. 4 and 5 show a variety of patterns on fragments. As they are evidently hand designs, the variations are very great.

Tons of fragments of this ancient pottery are scattered over the mesa and in the valleys, as well as in and around the cliff-houses. Either the makers were indefatigable potters, or else the race dwelt long in the land. In truth, we do not know whether they represent different periods, or whether the makers were of different races. That many of the designs are at least as old as the buildings is proved by the fragments, occasionally found imbedded in the adobe as chinking material. Less common are fragments of a red pottery without decoration, except peculiar streaks of black through it on the inner surface, and on the outer, indistinct patches of a dull greenish tint. Sometimes a mottled effect is evident. Holes have been drilled through the pottery in some instances, apparently after baking, and broken pottery was mended by tying a string through holes drilled in the fragments.

FOOD SUPPLY :—Maize or Indian corn ; the stalks, husks, tassels, silk, cob and kernel are frequently found. That some of this material is as old as the buildings is proved by the fact that the stalks were used in the construction of the floors, being actually imbedded in the adobe ; cobs being also used to chink the walls with, an impression of the cob in the now hard adobe being found on detaching one from its bed. Corn husks on the cob, knotted or braided and bunched much as the Eastern farmer treats his seed-corn, are not uncommon. As already mentioned, the husks were used as in-soling for sandals and for the padding of other articles. The corn itself was small, a yellow variety, some kernels showing a small dent. The cob was also small and short, usually about three inches in length. Jars of shelled corn have been found, but when the kernels are obtained from refuse heaps or open vessels the softer part has generally been gnawed away by some rodent, leaving only the hard outer rim. Efforts to sprout the complete kernels, it is said, have thus far proved unsuccessful. Reddish-brown beans of fair size are frequently found. The stems, rind and seed of gourd-like vegetables of different kinds are abundant ; some thin like a gourd, others squash-like, and another kind resembling the pumpkin. A kind of walnut has also been found. The American turkey was evidently an important factor in the domestic economy of the cliff-dweller. His feathers and quills were used for ornament and dress, his bones were worked up into useful household utensils such as awls and needles, and we can hardly doubt but that his flesh formed an important article of animal diet, if we may judge from the broken bones in the refuse heaps. That this people did not merely hunt the wild turkey, but succeeded in domesticating it seems probable from the abundance of droppings, particularly in certain small compartments, with which are mixed the down and feathers of this fowl. The droppings of smaller birds and different rodents are numerous under the cliffs, the accumulations of ages, but the arrangement, appearances and situation serve to distinguish them in many cases from the deposits just referred to. Deer bones, buckskins, sinews and horn show that one or more varieties of the cervidæ supplied these people with material for food, dress and utensils. The question will naturally arise in the mind of every reader of this list of articles found: How do we know that they belonged to the original builders and occupants of the cliff-dwellings and not to modern tribes, as so many of the articles resemble those known to be in use by Indian tribes? The truth is, that in many cases we cannot feel sure, yet examples of most of the articles described have been found in situations or under conditions which show most conclusively that they are not recent, but as old as some parts of some of the buildings; as in the instance cited of articles found imbedded in the mortar or under the ancient floors. Again, the uniformity of the findings over widely distant regions, wherever this class of buildings has been carefully examined, is strong confirmatory evidence; yet too much care cannot be taken in reaching conclusions in this sort of work.

HUMAN REMAINS:—The burial mounds on the mesa contain the decayed remains of human skeletons in abundance, and many in a fair state of preservation, yet nothing but the bones remain except pieces of pottery buried with the body, these usually in fragments. When the attitude can be determined it is usually the flexed position, the body having been laid on the side. Skeletons are also found buried among the ledges, where occasionally under the protection of some large mass of rock sufficient earth has been retained in which a shallow grave could be excavated. The best preserved human remains are found in the dry material under the cliffs. An occasional place of burial was on or under the floor of some room in the building. Sometimes the body was simply laid away in the dry dust, the room being sealed; in other cases the earthen floor covering the body shows the accumulation and effect of use after the burial. Where absolute protection from moisture has occurred, mummified remains have been found with the wrappings of the dead, in a more or less complete state of preservation. Although comparatively few have been found, the uniformity of method in dress and attitude shows what was their favorite method of burial. The outer wrapping consists of the willow matting already described. It forms a kind of burial case. Beneath this is usually a covering of rush matting, and next to the skin a wrapping of fibre cloth, or a mantle of the feather cloth already described. The flexed position on the side is the usual one. The hair of the head has been found partly preserved on some mummies. It is said to be of fine texture, not coarse like Indian hair, and varying in color from shades of yellowish-brown to reddish-brown and black. The writer was not able to verify this by personal observation, as no mummies were exhumed during the trip, but the facts are vouched for by many observers. The Wetherills exhumed one mummy having a short brownish beard. It is possible that a bleaching process may account for the change in color, though this is doubtful; it certainly will not account for the soft, fine texture of the hair. If this observation is corroborated in future findings, as they have been up to the present, an important ethnological fact will be established. A theory prevails in Colorado, which the writer was unable to trace to its originator, that three distinct races inhabited the land, the mesa dwellers with perfect skulls, the cliff dwellers with skulls having a perpendicular occipital flattening and the valley dwellers with skulls having an oblique occipital flattening. The theory is based on the fact that different shaped skulls have been found at these different situations. The number of skulls examined under the writer's observation were not sufficient to establish much ; yet he saw skulls removed from the mesa mounds which, contrary to the theory, were examples of both horizontal, and oblique flattening. The cliff-house skulls were perpendicularly flattened, and all these flattened skulls were asymmetrical. The angle and plane of flattening vary in different skulls, so that it may be readily conceived that in a large number of skulls we might find intermediate grades from the perpendicular to the oblique forms. While the theory advanced may be correct, the objection to accepting it is, that it rests on the examination of too few crania. While there is no doubt of the preponderance of perpendicular flattening in the cliff-dwellers skulls, we are not justified in concluding that they were necessarily a different race from the valley peoples who flattened their skulls differently. Localities may be found to differ, and the question should be left undecided until a larger number of skulls have been examined and proper craniometric observations made upon them. The specimens of crania seen do not usually impress one as of extremely low grade. They are brachycephalic but this is in great part due to the occipital flattening. The vault is well rounded, not sloping laterally like the crania of many Indian tribes. The teeth of adults are generally worn flat on the crown. The skeletons, while not exhibiting signs of unusual muscular development, as indicated by the rough points for the attachment of muscles and the curvature of the long bones, were yet well developed and of good stature. The mummy of a man found by the Wetherills measured 5 feet 10 inches, and that of a woman 5 feet 6 inches.

ROCK MARKING :—Attention has been called to the almost total absence of figures, decorative or otherwise, on the walls of the buildings. Rude characters, inscriptions and pictures are also very rare in the cañons of the Mesa Verde. A line cut in a spiral was the only object of the sort that came under the writer's observation; a photograph of this was lost by a faulty exposure. Their entire absence in so many of these more isolated villages should make us doubtful about the origin of those found on the valley walls, along lines of travel which modern tribes have used. Those found on high cliff walls, or at lower levels, consist of little more than a few crude attempts at picturing man and animals, impressions of the human hand, and attempts at geometrical figures, which rarely suggest that they could have been conventional signs of more than a local value.

Grooves in the sandstone, where stone implements have been ground and sharpened, may be seen on the ledges about almost every dwelling; broad, hollow grooves that would fit the larger axes, narrow lines where probably a bone awl was ground, or other sharp implement.

At certain levels, in some cañons, bituminous shales and thin seams of coal appear. John Wetherill states that he has found coal cinders in the ash heaps and fire basins of cliff-towns near such out-cropping, and regards this as proof that they recognized the value of coal as fuel and utilized it.

Before discussing the prevailing theories concerning this peculiar and primitive people, it is desirable to consider the extent and geographical distribution of their architectural remains as already found. This will be best attained by giving a brief *résumé* of what investigators have accomplished.

When Coronado in 1541 made his celebrated expedition and invasion of the region now known as Arizona and New Mexico, he found in ruins the buildings called Chichilticale, supposed to be the "Casa Grande" of southwestern Arizona, described by Emory in 1846–47, Bartlett in 1854, and other writers since. The resemblance of these ruins to the cliff-town buildings and the ancient Pueblos shows that before the Spanish invasion allied architectural structures had been reared and occupied, deserted and partly demolished, at a period too remote for the native tribes then occupying the land to tell aught of the former builders or occupants. Although there are abundant references to the Moqui, Zuñi and New Mexican Pueblo towns in the early Spanish records and later accounts by traders and travellers, there are few positive allusions to the high cliff structures of the San Juan and its tributary cañons. Lieut. Simpson described in 1848 the Pueblo ruins of the

Chaco Cañon, in which cliff ruins were found in addition to the extensive valley ruins.

The matter attracted but little attention until Jackson in the summer of 1874 made a hasty trip through the Mancos Cañon, up the Aztec Spring Creek, and into the McElmo Cañon. In the summer of 1875 he continued his explorations in the McElmo and Hovenweep Cañons, and over the country nearly as far north as the Dolores River, finding numerous evidences of cliff and valley ruins similar to those of the Mancos. Other ruins were found along the San Juan and on Epsom Creek, also in the Montezuma Cañon. Crossing to the southern tributary cañons of the San Juan system, the ruins of the Rio de Chelly were visited and described. In 1877 he visited, described and illustrated in an admirable manner the ruins of the Chaco Cañon referred to by Simpson. One skull was discovered, afterward described by Dr. Hoffman. It had an oblique occipital flattening.

Holmes, in 1875–76, went over the ground covered by Jackson in the Mancos Cañon, part of the San Juan Valley, Aztec Spring Creek and the McElmo region. He summarized the result of the work in his report for 1876.

These three reports of Jackson and Holmes (see Hayden's Rep. U. S. Geo. and Geog. Survey for 1874–1876) have served as the basis of original observation and scientific authority for archæological writers since. Considering the brief time allotted to these investigations, their results were remarkably full. Holmes speaks of the hurried character of his trip, while Jackson refers to his journey through the Mancos as a "hasty trip," and of his subsequent expeditions he remarks: "We can only expect to skim the surface, leaving to others hereafter the more satisfactory duty of exhausting each subject in detail." This "satisfactory duty," however, has never been done, either by the Government or any expert archæologist, so far as published records show. Fragmentary contributions have appeared in the writings of Newberry, in reference to the Dolores district, and of Major Powell, respecting the cliff-dwellings in the high walls of the Grand Cañon of the Colorado. Most of the remaining literature consists of popular newspaper and magazine articles, many of them containing excellent summaries of the matter (see an interesting narrative by Chapin of a trip to the Mesa Verde, *Appalachian*, May, 1890), but none representing investigations carried out according to modern scientific methods for ethnological and archæological research. Year after year, tourists and prospectors have visited one or another of the ruins described and carried away relics that could be found; others recognizing their commercial value have made a business of forming collections for exhibitions or sale. The latter class, in consequence of the time devoted to the subject, have come into possession of a much greater number of facts than other observers, and have really done good work in preserving and bringing to light these relics. Yet it is unfortunate that their work was not done under competent archæological advice, upon a definite plan of investigation, by which many details, still remaining in doubt, would have been settled by the material already secured. Besides several small collections of relics that have been made, there is the one brought from the Mancos Cañon by Chas. McLoyd and purchased by the Denver Historical Society, and the very large Wetherill Collection already referred to, obtained from the Mancos and other cañons of the Mesa Verde after several years' labor. In the fall and winter of 1890, Chas. McLoyd and C. C. Graham visited the lower San Juan valley in Utah and the cañons to the west tributary to the Colorado, and, chiefly in Grand Gulch Cañon, made, it is said, the largest collection of cliff-house relics yet brought together, It was taken to Durango and sold to Rev. C. H. Green, who afterward organized a party with McLoyd as guide, to visit the region in which the collections had been made and obtain photographic views of the same. Through the kindness of Mr. Leeka, the photographer of the expedition, the writer obtained much valuable information. The impressions of this conversation are, that almost the same kinds of articles were discovered as those obtained from the Mesa Verde region, and very little additional that would tend to modify conclusions drawn from previous collections. On the other hand, the collection strongly corroborates former findings. Further proof of the use of cotton was furnished not only by the presence of cloth and cordage, but also by the raw cotton itself, in which were found cotton seeds. Some half-dozen mummies were exhumed, corroborating the manner of dressing and burying the dead, already described, as well as showing that the hair was of fine texture and of light color.

Finally, Mr. Lumholtz's unfinished investigations in the Sierra Madre Mountains of Mexico may be mentioned. They are already familiar to the readers of the

BULLETIN. His preliminary report seems to show that the same class of cliffs and cave dwellings exist in this region as are found in the districts already described; about the same kind of relics have been found, and mummified remains presenting similar wrappings, the same attitudes and hair of fine texture.

It will be seen that the people who erected the cliff-houses were distributed over a considerable area, chiefly confined to the Colorado drainage area; so far as known, mostly to its eastern tributaries, the San Juan and its cañon system having shown the principal collections of ruins. Yet many parts of Arizona present examples, and how far their structures extend to the south, in Mexico, still remains to be determined.

How perfect a picture can we construct of this ancient civilization from the fragments that remain? An outline only. These people were not workers in metals. Stone and wood, bone and horn, were the materials from which they formed their implements. Yet the two great primitive arts, weaving and the making of pottery, they had acquired, and their rude but substantial architecture, executed under conditions which must have required great patience, perseverance and considerable skill, indicate their attainments as stone masons and architects. The store of agricultural products, their corn, and beans, and squashes, show them to have been tillers of the soil as well. Their fixed habitations and their development of these arts differentiate them from the nomadic tribes. Yet all these qualifications fail to show that they had reached more than a low grade of development. Weaving is an art acquired by races very low in the scale, and the potter's art is also a very early acquirement of primitive peoples. They were a race without a written language, and we have nothing by which to determine under what form of government they lived, their social regulations, or their religious beliefs. The estufas, it is thought by some, were places for religious ceremonies; this being suggested from the fact that the Pueblo Indians used their estufas for such purposes, but they also used them as council chambers, and some Spanish writers maintain that they were assembly rooms for males. The fact that they served any particular purpose in other societies is not proof that they were put to the same use by these primitive people. Notwithstanding their cultivation of the pacific arts, the hunter and the warrior still had important functions to perform. The skins and bones tell the story of the chase; the bow and arrow and spear represent implements with which to obtain food and maintain defence. It is presumable that resistance rather than aggression was their plan of warfare. The selection of such impregnable positions for their towns in the cliffs would seem to have no other reasonable object than that of defense. Holmes inferred that the valley ruins represent the permanent habitations of these people and that the houses in the cliffs were occupied for refuge in time of invasion only. In the light of subsequent examinations this theory appears highly improbable. The numerous signs of long continued occupation, the implements, products and refuse incident to the manufacture of dress and pottery, and to the obtaining of food by tilling the soil,as well as the substantial character of the buildings, together with their wide distribution far away from valley towns, are facts indicating permanent habitation.

Although it seems difficult to find any other reason for such seclusion than that of defence against surrounding warlike foes, yet we cannot deny but that, originating in this manner, subsequent generations may have acquired a fondness for these cañon fastnesses, these eagle nests, and continued to occupy them from habit and inclination rather than from necessity. Generations born and reared amid the surroundings that cliff life afforded, becoming adapted to the conditions, would probably be as well satisfied with the situation as primitive people usually are, and as dissatisfied if forced to abandon it.

To many, however, the great problem is, how the cliff dweller maintained his food supply. Admitting that he had corn and beans, where did he raise them ? If a tiller of the soil, where did he find soil to till ? A glance at the bare ledges around his habitation, at the distant cañon bottom far below, at the dry mesa above with its contracted water shed, does not reassure one that the answers are at hand. If we assume that the people of the broader valleys supplied them, with such a distant source of food supply we would have a very precarious situation in time of invasion ; besides, it is hardly probable that if their corn was obtained in the distant valleys they would have carried along the cornstalks, so abundant in the houses. A favorite way out of the difficulty is to assume that, when these towns were built and occupied, the climate was more humid and cultivation of the soil easier than now. This is not only an unwarrantable assumption, but an unnecessary one as well. The perfect preservation of so many of these ancient ruins and their contents is accounted for by their protection from moisture. How can we reconcile this with the existence of a humid climate during their occupation? What would have been the necessity of the numerous attempts at water storage, if the climate had not been an extremely dry one? On the mesa top, little gulches that incline toward the cliffs frequently show the remains of small dams of stone built across them at intervals of a few feet. These may have served as water tanks, filled during the heavy showers that fall in the summer, more probably they were terraces formerly filled with earth in which crops were planted. Winter snows and summer rains would keep them sufficiently soaked to insure the growth of a crop like corn or beans. At some periods of the year they may have been watered. Natural excavations in the rocks large and small so situated to receive a flow of water during rainfall and retain it seem to have been utilized, if we may judge from steps cut in the rocks about such places and attempts to build up the low part of a basin artificially. About the houses also devices for collecting and storing water are evident. The needs of each of these small communities were not so great that large areas of tillable land would be required, and the mesa, if the cliff-house was high, was the most available place for their small gardens; while for houses accessible from below, the cañon bottom could have been utilized. With attention to the collection of water in their larger cisterns and reservoirs, the snows of winter would have furnished them with a sufficient supply for a part of the year, while the torrents that fell in the summer would have enabled them to replenish their supply for other portions of the year. Water storage was probably the great secret of the cliff dweller's ability to maintain himself in this arid region.

During the writer's sojourn on the mesa, in August, rain fell almost every day, and during some of the showers the streams that poured down the gullies were of considerable size. Those who know the power of torrential action as shown by a Colorado "washout," know that the so-called cloud-bursts of these dry plateau regions will accomplish a vast amount of erosive work in a very short time; so that it is unnecessary to assume a greater water power than now exists to account for the erosive action that has been going on for ages and is still going on in these regions.

Concerning the source of the cotton supply which this people had, it may be said that cotton was a comparatively rare article. The yucca fibre served as the fibre for almost all textile fabrics, and as raw cotton, wicking, string and cloth have been found more abundantly in the cliff-houses of the lower San Juan, near valleys of less altitude than those of the Mesa Verde, it is not improbable that the inhabitants of the latter region obtained it by some system of barter from the people of warmer valleys where it could be cultivated.

The interesting question as to the period at which this primitive civilization flourished has never been settled, and probably never will be. In the absence of written records, it is next to impossible to assign these architectural remains to their proper chronological place. There are no data by which the age of these stone structures can be determined. If they were found on the Atlantic seaboard with their contents in such a perfect state of preservation, we would know that they must be very recent, for dead vegetable matter soon disappears in a climate of even moderate humidity. In the dry atmosphere of the region in which they are found, protected from rain by overhanging cliffs and covered with dry dust if undisturbed, they would probably remain unchanged for hundreds, if not for thousands of years.

The marked difference in the state of preservation between the ruins under the cliffs and those outside, which have been more exposed to the action of the elements, is suggestive of great age for both classes, and great differences in the age of ruins in different localities, as well as those under the same cliff, are suggested by their varied appearances and degrees of preservation.

Cliff caverns are found with marks in the rocks made by axe grinding, and having the foundations of former houses, but without the usual mass of stones that formed the upper walls. These had apparently been carried away to supply material for new houses in the vicinity.

As it is impossible to tell when any of these cliff-houses were erected, so it is also impossible to determine over how long a period this system of architecture and civilization continued. The well-known persistence in the habits of primitive peoples should make us cautious in assigning the beginning of their architectural works to too recent times; while on the other hand, we may err in assuming that the latest occupation of these cliff-houses was very remote. There is nothing unreasonable in the view that they were still occupied to some extent as late as the Spanish invasion, though there is no direct proof that they were. Most of the cliff structures referred to by the Spanish invaders were Pueblo buildings at lower levels in the cañons, and not the high cliff-towns. Yet the transition from the stone cliff-house to the more modern adobe Pueblo is strongly suggestive that the latter are an evolution from the former: an adaptation to the wants of larger communities and to differences in situation and available building material. The Spaniards found Pueblo tribes, using many articles similar to these found to-day in the cliff-houses. The bow with a sinew bowstring, arrows and spears with flint and bone points, numerous articles of dress made from the yucca, including sandals, cotton fabrics, similar food material, such as corn, beans, gourds and domestic fowls, and pottery of various kinds. They had no implements of metal, they ground their corn on metate stones, and it is said they planted it early, so that the late snows on melting would water it. They had no written language. Surely this is not a very different picture from the one sketched above from the remains of the cliff dwellers, and it is difficult to resist the conclusion that one civilization was the outgrowth of the other. This does not prove, however, that the cliff dwellers were of the same race as the Pueblo tribes. Conquered or conquering races, may adopt the customs and methods of another race with which they have been brought in contact. The existence of a system of architecture among a people does not show that they were the originators of it, they may have been mere imitators and adaptors. There is little question that the inhabitants of the Pueblos as found by the Spaniards were made up of a variety of tribes. The spoken language of the different Pueblos showed such radical differences that we must assume former periods in which they were more isolated. Considerable physical differences were also noticed. Some of the towns (presumably of the Moquis), had people who are described as having soft wavy hair and a " somewhat whitish skin." Here we have another link in the chain leading back to the mummified remains found in the cliff-houses. The question as to the race of the cliff dweller cannot be answered, but that we have in the Moquis of to-day an admixture of the ancient cliff dweller is not improbable. This does not in any way settle the origin of any of these tribes. The mingling of varieties of the human species may have gone on for thousands of years ; wilder tribes amalgamating with the more pacific ones, one community acquiring control of or partly destroying others, towns left in ruins, the earlier traces obliterated, leaving no clue as to the origin of the people or when the country was first occupied.

H. H. Bancroft has done good service in showing the insufficiency of the historical, architectural and linguistic evidence in favor of the popular theory of the migration of tribes from New Mexico and Arizona to those regions of Mexico, in which are found the great architectural remains of the Mayas and the Nahuas ; or the reverse theory, that the Pueblo tribes are the offspring of a northern migration from these regions. While admitting the possibility of the unity of these races in the extremely remote past, there is not sufficient evidence to show that their civilizations had any influence on each other. Whence came the race with pale skin, soft hair, and flattened skull ? This question will probably never be correctly answered.

GEOGRAPHICAL NOTES.

BY

GEO. C. HURLBUT, *Librarian.*

THE POPULATION OF THE EARTH.*—The seventh number of this publication, which was founded by Behm and Wagner in 1872, appeared in 1882. A considerable portion of the eighth number was ready for the press, when the death of Dr. Behm, on the 15th of March, 1884, put a temporary stop to the work, and circumstances have delayed its production till the present year. It will be henceforth published periodically, but at what interval is not stated.

The total population of the earth is estimated at about 1480 millions, divided as follows: Europe, with 9,729,861 square kilometres † has 357,379,000 inhabitants; Asia has 44,142,658 sq. kil. and 825,954,000 inhabitants; Africa 29,207,100 sq. kil., and 163,953,000 inhabitants; America (N. and S.) 38,334,100 sq. kil., and 121,713,000 inhabitants; Australia (and Tasmania) 7,695,726 sq. kil., and 3,230,000 inhabitants; the Oceanic Islands 1,898,700 sq. kil., and 7,420,000 inhabitants; and the Polar Regions 4,482,620 sq. kil., and 80,400 inhabitants. In the figures for Asia are included the islands, excepting those of the Arctic ; Iceland, Nova Zembla and the Atlantic islands are left out of the calculation for Europe, Madagascar and other islands are excluded from the estimates for Africa, and the Polar Regions from the American estimate.

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* Die Bevölkerung der Erde. Periodische Übersicht über neue Arealberechnungen, Gebietsveränderungen, Zählungen und Schätzungen der Bevölkerung auf der gesamten Erdoberfläche. Herausgegeben von Hermann Wagner, Göttingen, und Alexander Supan, Gotha, VIII. Mit fünf Karten.

Ergänzungsheft No. 101 zu "Petermanns Mitteilungen."

Gotha, 1891.

† 10,000 square kilometres = 3861.161 square miles.

The detailed figures for Europe are :

	Sq. Kil.	Population.
Central Europe :		
German Empire,	540,419	49,424,135
Austria-Hungary,	625,518	41,284,966
Bosnia & Herzegovina,	51,110	1,336,091
Principality of Liechtenstein	159	9,593
Switzerland	40,820	2,933,334
Luxemburg	2,587	211,088
Netherlands	33,000	4,558,095
Belgium	29,457	6,093,798
Total,	1,327,633	105,851,000
Northwestern Europe:		
Denmark	38,279	2,172,205
Faroe Islands	1,333	12,954
Sweden	450,574	4,774,409
Norway	325,285	1,999,176
Great Britain and Ireland	314,628	37,888,152
Total	1,130,099	46,847,000
Southwestern Europe :		
France	536,408	38,218,903
Principality of Monaco	22	13,304
Republic of Andorra	452	6,000
Spain (without Canary Islands)	497,244	17,246,688
Gibraltar (British)	5	24,696
Portugal (without Azores and Madeira)	89,372	4,306,554
Italy	286,588	30,158,408
Republic of San Marino	59	7,920
Malta (British)	323	174,621
Total	1,410,473	90,157,000
Southeastern Europe :		
Greece	65,119	2,217,000

Turkey (including Crete)	168,533	5,600,000
Bulgaria and E. Rumelia	96,660	3,154,375
Novi-Bazar	7,350	153,000
Montenegro	9,080	200,000
Servia	48,110	2,157,477
Romania	131,020	5,000,000
Total	525,872	18,482,000
Eastern Europe :		
Russia (and Poland)	4,924,567	93,703,331
Finland	373,612	2,338,404
Total	5,335,784	96,042,000
The Asiatic Details are:		
Siberia (without Arctic islands)	12,488,348	4,314,000
Russ. Central Asia and Turkistan :		
Russian Central Asia	3,504,908	5,327,000
Khiva	60,000	500,000
Bokhara	205,000	1,250,000
The Pamir	66,000	30,000
Total	4,342,315	7,107,000
Western Asia :		
Russian Caucasia	472,554	7,285,000
Asiatic Turkey	1,778,168	15,475,000
Sinaïtic Peninsula (to Egypt)	59,000	4,147
Cyprus (British)	9,601	209,291
Arabia (not Turkish)	2,505,119	2,272,000
Persia	1,645,000	7,500,000
Afghanistan	550,000	4,000,000
Kafiristan and Hindu Kush	71,000	600,000
Baluchistan and the Afghan-Indian Border	432,000	1,020,000
Total	7,522,442	38,365,000
Central and Eastern Asia :		
China (proper)	4,004,650	350,000,000
Manchuria	942,000	7,000,000
Interior Chinese Territories	6,169,000	4,500,000
Hongkong (Br.) and Macao (Port.)	91	266,000
Korea	218,650	10,519,000

Japan (without Bonin Islands)	382,345	40,072,020
Total	11,716,736	412,357,000
India :		
British India (without regions in Iran and Farther India)	3,655,730	278,582,000
French and Portuguese India	4,167	797,000
Ceylon (with Maldives)	64,276	3,038,000
Himalaya States	218,000	3,260,000
Total	3,942,173	285,677,000
Farther India :		
British Upper and Lower Burma	414,951	7,554,000
Lushai, Kachin and Shan States	321,300	2,000,000
Karenní	10,700	50,000
Siam	800,000	9,000,000
Straits Settlements (British)	90,000	1,158,000
French Farther India	489,500	18,914,000
Total	2,126,451	38,676,000
East Indian Islands :		
Andaman and Nicobar Islands	8,270	28,000
Sunda Islands and Moluccas	1,699,741	34,430,000
Philippines and Sulu Islands	296,182	7,000,000
Total	2,004,193	39,458,000

For Africa the figures are :

North Africa :		
Morocco (including the Spanish Presidios)	812,300	8,015,798
Algeria	667,100	3,855,700
Tunisia	116,300	1,500,000
Tripoli	1,033,400	1,000,000
Egypt	935,300	6,818,000
Total	3,564,400	21,189,500
Sahara	6,180,400	2,500,000
North-tropical Zone :		
Tropical N. E. Africa	4,578,200	28,422,000
Middle Sudan	1,548,100	27,300,000
Western Sudan and Upper Guinea	2,159,900	33,034,000

Equatorial Region	2,016,700	16,000,000
Total	10,302,900	104,756,000
South-tropical Zone:		
Congo State	2,241,250	14,100,000
Angola	1,339,450	12,400,000
German East-Africa	955,220	2,900,000
Zanzibar	2,560	210,000
Mozambique	801,970	800,000
Zambezi Country	1,604,480	1,350,000
German S. W. Africa	835,100	200,000
Total	7,842,150	31,960,000
Extra-tropical S. Africa:		
South African Republic	294,300	679,200
Orange Free State	130,700	207,503
Swaziland and Tongaland	21,510	91,000
British South Africa	870,720	2,570,000
Total	1,317,230	3,547,700

The American countries are given in detail, as follows:

North America:		
British N. America	8,412,170	5,273,200
French Possessions	235	5,983
United States	9,212,300	62,981,000
Mexico	1,946,523	11,395,712
Total	19,810,200	79,656,000
Central America	547,308	3,231,400
West Indies	244,478	5,482,800
South America:		
Venezuela	1,043,900	2,238,900
Guiana	437,600	373,900
Brazil	8,361,350	14,600,000
Paraguay	253,100	330,000
Uruguay	178,700	711,700
Argentina	2,789,400	3,203,700
Chile	776,000	3,165,300
Bolivia	1,334,200	1,434,800

Peru	1,137,000	2,980,000
Ecuador	299,600	1,204,400
Colombia	1,121,280	3,100,000
Total	17,732,130	33,342,700

The Australian divisions are :

Australia (mainland)	7,627,832	3,073,000
Tasmania	67,894	156,622
Total	7,695,726	3,230,000

The Oceanic Islands are divided into :

The South Sea Islands :		
New Guinea group	807,956	837,000
Melanesia	145,892	642,300
New Zealand group	271,067	673,500
Micronesia	3,540	94,100
Sandwich Islands	17,008	92,050
Polynesia	17,437	115,600
Total	1,262,900	2,454,600
Islands of the Indian Ocean	603,718	4,139,900
Atlantic Islands	32,082	825,357

The Polar Regions are estimated as follows :

Arctic :		
Arctic America	1,301,080	1,000
Greenland	2,169,750	10,221
Iceland	104,785	69,224
Uninhabited islands	250,000	......
Total	3,825,620	80,400
Antarctic	657,000	......

The lakes, gulfs, and inland seas named are included in the total area of each of the following divisions :

Central Europe :		
Gulfs of the Baltic Sea	3,446	sq. kilometres.
Lake Constance and Lake of Geneva.	1,117	"
Eastern Europe :		
Sea of Azov	37,605	"
Russian Central Asia and Turkistan :		
Aral and Caspian Seas	506,407	"

Africa, South-tropical Zone:		
Lake Nyassa	26,500	kilometres.
Lake Tanganika	35,620	"
North America:		
Canadian Lakes	238,971	"

It is to be remembered that, for many countries of the world, these figures represent only the *probable* population and area, estimated, in the absence of exact data, from the most trustworthy information within reach.

The most densely peopled country is Belgium, with 533 to the square mile. Then follow: The Netherlands with 355, Great Britain and Ireland with 319, Italy with 270, The German Empire with 233, Switzerland with 184, France with 182, Austria-Hungary with 169, Denmark with 146, Portugal with 123, Servia with 116, Romania with 97, Spain with 88, Greece with 87, European Turkey with 82, European Russia (without Finland) with 48, Sweden with 27, and Norway with 14.

In Asia, French and Portuguese India have 489 to the square mile, Japan has 270, China Proper 231, British India 195.

In America, the greatest density of population is in the French possessions, which have 64 inhabitants to the square mile. The West Indies come next with 56, and then the United States with 18, though the *Statesman's Year-Book, 1891*, makes the density 21.5. Mexico and Central America have, each, 15, Uruguay, Chile and Ecuador, each, 10, Colombia has 7, Peru 7, Venezuela 5, Brazil 4.8, Paraguay and the Argentine Republic have, each, 3, Bolivia has 2.5, and British North America 1.6.

Australia has 1 inhabitant to the square mile, and New Zealand counts 5.

THE NICARAGUA CANAL AND THE SOURCES OF THE MISSISSIPPI AT THE INTERNATIONAL GEOGRAPHICAL CONGRESS.—Dr. H. Wichmann writes as follows in *Petermanns Mitteilungen, Band 37, X*, (p. *250*), concerning the remarks on the Nicaragua Canal, made by Mr. Stout before the Congress at Berne, last August:

"Mr. A. Stout's address on the Nicaragua Canal was insufficient alike in form and substance; and a decided protest should be raised against taking advantage of a Geographical Congress to further a financial enterprise."

Mr. Stout (who spoke for himself alone) had but just reached Berne when the Congress began its sittings. He had prepared a paper, but other speakers were to follow him, and he confined himself in his address to pointing out in a general way the fitness of the Nicaragua route for a ship canal.

It is not easy to understand why the subject of an Interoceanic Canal may not be brought before an International Geographical Congress, with or without the approval of Dr. Wichmann.* An interoceanic canal must largely affect the future of civilization; and geographers may be supposed to take an interest in the progress of mankind.

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* The First International Geographical Congress was held at Antwerp, August 14–22, 1871. This Congress considered the advantages to Belgian commerce likely to result from the opening of the Suez Canal, and recommended Mr. A. de Gogorza's plan for a canal across the Isthmus of Darien.

The Second International Geographical Congress held in Paris, August 1–11, 1875, discussed the question of the proper line for a canal between the Atlantic and Pacific Oceans.

The Third International Geographical Congress, held at Venice, September 15–22, 1881, expressed itself in favor of the project for a canal across the Isthmus of Corinth.

The objection that the Nicaragua Canal is a financial undertaking does not dispose of the matter. It is a condition of most human activities that they shall be paid for; and Dr. Wichmann, who has devoted so much of his own energy to the success of *Petermanns Mitteilungen*, must be aware of this condition. It is understood that the Justus Perthes' Geographische Anstalt, which publishes the *Mitteilungen*, is a private establishment, organized on commercial principles, and deriving its revenue from the sale of its productions. The International Geographical Congress at Berne, none the less, felt itself justified in voting a testimonial to the Justus Perthes' Anstalt in recognition of its not wholly unselfish labors in the cause of geography; and Dr. Wichmann does not appear to have recorded his protest against this recognition.

The paper on Capt. Glazier's pretended discovery of the source of the Mississippi River fails to please Dr. Wichmann. He says:

"It was in the highest degree superfluous for G. Hurlbut to stir up the question of the Mississippi Source. It has been known for a long time in Europe that the pretensions of Capt. W. Glazier to the discovery of the real source were unfounded." It was in the name of the American Geographical Society that G. Hurlbut's paper, having been considered by the Council, was submitted to the Congress. It was read and referred to a special Committee; and the unanimous report of this committee in its favor was accepted and registered as the decision of the Congress. Under these circumstances Dr. Wichmann's expression of opinion seems to be a superfluous thing, the rather that it is an outcome of insufficient acquaintance with the subject. Capt. Glazier's pretended discovery, said to have been made in June, 1881, would have passed into oblivion but for the unfortunate action of the Royal Geographical Society, which published his letter and map in its *Proceedings* for January, 1885.

Supported, and never disavowed, by this authority, to which he constantly appealed through the press, Capt. Glazier made himself an obstruction and a reproach. His pretensions owed their vitality to the help of a well-known European Society; and it was nothing less than imperative that he should be made to take his true position before an International Geographical Congress, mainly composed of Europeans, and holding its deliberations in a European city.

AMERICAN EXHIBITION IN MADRID.—The Spanish Government gives notice that a Historical American Exhibition, in commemoration of the Fourth Centenary of the Discovery, will be opened in Madrid on the 12th of September, 1892, and closed December 31st, following. The Exhibition will comprise all objects relating to the history, social condition and civilization of the New World, before and at the time of the Conquest.

Articles for exhibition must be securely packed and delivered to the Committee in this city, after which all charges will be paid by the Managing Committee.

Space for exhibition will be allotted, free of expense.

All arrangements for display of articles must be completely finished on the 31st of August, 1892. Objects may not be withdrawn before the closing of the Exhibition.

Articles to be returned abroad will be passed free of duty.

An international Jury will be appointed to award prizes, classified as follows:

First Prize of Honor.
Gold Medal.
Silver Medal.
Brass Medal.
Honorable Mention.

Mr. A. Baldasano, Spanish Consul-General in New York, is the President of the Commission in the United States.

BELTRAMI AND THE MISSISSIPPI RIVER.—Prof. G. Ricchieri, in a report printed in the *Bollettino* of the *Società Geografica Italiana*, for October, 1891, makes some remarks (p. 844) on Mr. Hurlbut's paper, read before the International Geographical Congress at Berne. Prof. Ricchieri regrets the failure to mention in this paper the name of Beltrami, as one of the discoverers of the Mississippi River: and he does not doubt, that, if Prof. Pennesi, who has fully treated the subject of Beltrami's exploration,* had been present at the Congress, the rights of the Italian traveller would have been defended.

It is an easy matter to defend a man when he is not attacked. Prof. Ricchieri has failed to note that the paper read before the Congress at Berne was on "The

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* *Bollettino* of the *Soc. Geog. Italiana*, June, 1886, p. 444, *et seq.*

Pretended Discovery of the Source of the Mississippi River by Capt. Willard Glazier."

The historical facts as to the real discovery were to be recalled with brevity. It was proposed to tell only the essential part of the story, as more than sufficient to show the emptiness of Capt. Glazier's pretensions.

Beltrami's name was not mentioned, because it could have added no weight to the argument.

Prof. Pennesi's article, already referred to, makes the best of a dim case. It is certain, if we believe his story, that Beltrami visited the upper waters of the Mississippi in the year 1824; but it is impossible to tell how much or how little he discovered, through the wordiness of his rhapsodical letters, filled with inevitable sentiment and recollections of Lempriere's Dictionary. His contribution to the knowledge of the source of the river was less than that made by Schoolcraft in 1820.

SAVAGE RELIGION.—The London *Times* has an abstract of a paper on "The Limits of Savage Religion," read on the 10th of November by Dr. Edward B. Tylor (disguised as Taylor in *Science* of Dec. 4,) before the Anthropological Institute of Great Britain and Ireland.

It was necessary, Dr. Tylor said, to distinguish the genuine developments of native theology among the lower races from the effects of intercourse with civilized foreigners. He held that, especially through missionary influence since 1500, ideas of dualistic and monotheistic deities and of the moral government of the world had been implanted on native polytheism in various parts of the globe. Three principal causes had been at work to disfigure the original barbaric beliefs: 1—Direct adoption from foreign teachers; 2—The exaggeration of genuine native deities of a lower order into a supreme god or devil; 3—The conversion of native words denoting a whole class of minor spiritual beings, such as ghosts or demons, into individual names alleged to be those of a supreme good deity or a rival evil deity.

Conspicuous among cases of borrowing from the beliefs of a higher culture was the famous "Great Spirit" of the North American Indians; an undoubted product of missionary teaching. Missionaries and travellers among the tribes of the Orinoco region have recorded the names of great divine beings both good and evil; and these names, when translated, suggest an origin outside of any native development of religion. They may be interpreted as "The Highest," "Lord of All," "Creator," and "Our Great Father"; and all these are obviously to be attributed to the missionary teaching which has been going on for three centuries. The Maipuris explained to Father Gilij how their spirit Purrunaminari (Lord of All) created man, and formed woman afterwards by extracting a rib from man during his sleep; and, also, how light was created before the sun. They had an account, reproducing the very details of the divine birth, according to Christian dogma; and this Father Gilij accepted as proof of a tradition preserved from the beginning of the human race, overlooking the intercourse of the Maipuris with Europeans since the year 1535. These tribes of the Orinoco had stories of a universal deluge, with details plainly borrowed from the Europeans, such as the sending of the waters from which only one man escaped in a canoe, and the rat, sent out to discover whether the waters had subsided and returning to the canoe with an ear of Indian corn.

Australia supplied other illustrations of the subject. Bishop Salvado (?), of the Benedictine Mission in West Australia, gave an account of the savages' belief in an omnipotent creator called "Motogon" (held to be a wise old man of their own race) and also in a malignant spirit called "Chenga." Sir George Grey and Advocate-General Moore, who had previously described and studied this region and languages, found that the natives spoke of a spirit "Mittagong," who was an insignificant demon, identified with phosphoric fungus; and as for "Chenga," he was not an individual at all. The dead were called "djanga," and this word was applied by the savages to the white men, whom they regarded as the spirits of their forefathers returned. This misapplication of the name of a class to a particular person was largely due to the fact that communication between savages and white men was carried on in dog-English. The savage, living in terror of beings closely corresponding to our ghosts, or demons, learned to call these by the name of "devil," and the white man, accustomed to the idea of a dominant Satan, wrote the word with a capital letter.

The German Moravian missionaries, who went into the interior of Victoria in 1850, recorded that they found among the natives a belief in a spirit, "Baiame," the creator of all things, who dwelt above the clouds. Mr. W. Howitt also described this spirit, and gave the following account, told by a native sorcerer, who had gone to Baiame for instruction in the supernatural: "My father had said, we will go to Baiame's camp. He got astride of a thread, and put me on another, and we held by each other's arms. At the end of the two threads was 'Wambu,' the bird of Baiame. We went through the clouds and on the other side was the sky. We went through the place where the doctors go through, and it kept opening and shutting very quickly. My father said that if it touched a doctor as he was going through it would hurt his spirit, and when he returned home he would sicken and die. On the other side we saw Baiame sitting in his camp. He was a very great old man, with a long beard. He sat with his legs under him, and from his shoulders extended two great quartz crystals to the sky above him. There were also numbers of the boys of Baiame and his people, who are birds and beasts."

Some of these details recall, as Dr. Tylor remarks, conventional Christian pictures of the Almighty ; and he concludes his paper by saying that, in examining a good many savage religions, he has been led always to the same result. In the religion of the lower races the civilized observer finds himself on familiar ground among ghosts, fairies, devils and deities of the sky, of the sun, and of the river. Native religions extend, therefore, to the distinct appreciation of gods of high rank in a polytheistic system ; but to go one step further and to look for ideas of one supreme good being and one potent evil being is, in Dr. Tylor's opinion, to get altogether beyond the religion of the lower races.

The general soundness of the argument must be admitted, but it must be used with caution. It is conceivable that the idea of the fatherly relation may be extended by the untutored savage mind to the realm of the spirit-world ; and Dr. Tylor seems to strain a point in his interpretation of the Baiame story. Conventional Christian pictures of the Almighty, even if they were commonly reproduced, would hardly be available as elements of instruction for savages, to whom an engraving, or a colored print, is almost without significance ; and the mental development of the civilized man contributes quite as much as the backward condition of the savage to their mutual misunderstanding.

There is also a constant source of error in the assumption that missionary teaching, because long continued, must have reached all the tribes within a given area.

THE PIONEER OF OCEAN STEAM NAVIGATION.—It appears from an address, delivered March 31, 1891, before the Literary and Historical Society of Quebec by Mr. Archibald Campbell, one of the Vice-Presidents of that Institution, that the *Royal William* was "the first Ocean steamship to cross the Atlantic solely propelled by the motive power of steam."

It is generally believed that the first steam vessel that crossed the Atlantic was the *Savannah*, which left Savannah, Ga., May 20, 1819 (the New Am. Cyclopædia says *in 1818*), and arrived at Liverpool about a month later ; but this vessel used sails as well as steam, while the *Royal William* was built by Canadians "expressly as an Ocean steamship to contend with the storms of the Atlantic," which she did successfully, and made the voyage from Pictou to London in 20 days in the summer of 1833. The fact is established by two letters of her commander, Capt. John McDougall, and by a mass of corroborative testimony ; but all this was so completely unknown that when it was proposed to lend the model of the *Royal William* to the Naval Exhibition in London, in May, 1891, Capt. Jephson, the Honorary Secretary of the Naval Committee, requested the Quebec Society "not to send the model unless it could be well authenticated that the *Royal William* was really the first steamship to cross the Atlantic."

This very proper request utterly astonished Mr. Campbell. "What!" he exclaims, "a Naval Committee not know that our *Royal William* was the first steamship ever to plough the Ocean without the aid of wind, aye, and against it; that Ocean upon which Britannia boasts to be mistress. . . . !!"

There is compensation in all things. If the Naval Committee had been acquainted with the history of the *Royal William*, Mr. Campbell might not have been moved to print his paper. The brave men who lived before Agamemnon are yet unsung, but the Canadian vessel has found her sacred bard.

THE MOOSONEE DIOCESE.—An undated letter from the Bishop of this Diocese, published in the *Greater Britain Messenger* for August, 1891, tells of an existence under conditions strangely unlike those of the busy world.

The Bishop writes from "Moose Factory, viâ Mattawa, Ottawa River, Canada." He had been occupied during the early and latter parts of the year with "scholastic and translational duties." His divinity students were entirely under his own charge, and his translations had employed every available moment. "I have now ready for the press," he says, "the Pentateuch, Isaiah, Jeremiah, the Lamentations, Ezekiel, and Daniel; the Psalms and New Testament have been in print for some years. The whole Bible will, I trust, form the crown of my missionary life, which, by the time this letter is in your hands, will have been of forty years duration." A work as great and as futile as Eliot's Bible.

The Moosonee Prayer Book and Hymnal, both of the Bishop's own translation, had reached him by the last "annual ship." Moose Factory is on James Bay, at the mouth of the Moose River. A hundred miles east of Moose is Rupert's House, where the Bishop, for six months of the year, ministered to the Rupert's House Indians, and those from "Mistasinee, Waswanepe, Nitchekwan, and Mackiskun," who come once a year to exchange their furs for clothes and imported food. They showed by their contributions that they valued their spiritual privileges.

In July the mission was continued to East Main River, and thence up the eastern coast to Fort George, and the storm-beaten land of Great Whale River. Eskimo and Indians were met by the way, "and here and there," says the Bishop, "we made the desert rejoice with some of the songs of Zion."

The Eskimo were particularly earnest, and fixed their attention on their books; and some of the Indians were equally good, "but many take but little concern about their souls, and think it enough for them to devote their attention to obtaining food for the body, a matter of no small difficulty in their ungenerous land."

Moose Factory, though little more than five hundred miles from Quebec, is apparently more inaccessible than Central Africa.

A FRENCH REPORT OF THE PEARY EXPEDITION.—*La Revue Française*, of December 1, has the following intelligence, presumably from its own correspondent:

"The American expedition of Capt. Peary, accompanied by his wife, is on the North West Coast of Greenland.

"It passed the winter of 1890–91 at Whale Sound, and tried without success to reach the coasts north of Greenland by crossing the *indlandsisen.* It was forced to retreat to McCornieck Bay.

"The passage through the ice in Melville Bay was very difficult. On the 30th July, the steamer *Kite* left Ryder, who had just broken his leg. An expedition is to be sent next year to bring him back."

Mr. Peary, who is not yet a captain, left New York with a party, including Mrs. Peary, on the 6th of June, 1891, in the steamer *Kite*, bound for Whale Sound on the North West Coast of Greenland. The *Kite* met with obstruction from the ice in the Strait of Belle Isle, but even this experience does not justify the steamer in heartlessly deserting Ryder, when he had broken his leg. It is true that Ryder had no business on board that galley, and ought to have been attending to his own affairs as commander of the Danish expedition to the eastern coast of Greenland; but it is a satisfaction to know that the *Revue Française* will pick him up, if he lives through the winter.

THE UNSPEAKABLE TURK.—*Biblia, Vol. IV., No. 5*, tells an instructive story of the American Expedition to Babylonia under Prof. John Peters, of the Episcopal Theological Seminary, Philadelphia.

Among those who accompanied Prof. Peters were

Prof. R. F. Harper, of Yale, Prof. Hilprecht, Mr. P. Field, and Mr. Prince. These gentlemen were well armed, and they smuggled their arms ashore at Beirût in defiance of the Turkish law, by a device which Dirk Hatteraick might have admired :

"The revolvers and Winchester rifles were lowred to a small boat on the port side of the steamer, which for the moment was hidden from the view of the officials, and upon Nurian's suggestion were wrapped carefully in oiled silk. They were then lowered into the sea. After the customs' officers had left the steamer, a native dived to the bottom of the harbor, five fathoms deep, and the arms were recovered in good condition, and smuggled ashore in an unfrequented spot. Two days later they were delivered to the chief of the expedition, but the fees to various natives amounted to nearly the value of the fire-arms. Had the smugglers been caught, the punishment, according to Turkish law, would have been imprisonment for life."

This looks like a corrupt transaction on the part of the natives, clearly unworthy as they were of the confidence reposed in them by the gentlemen of the expedition.

It was much the same in the interior of the country. The Turkish law prohibits the exportation of antiquities, and in the face of this prohibition Prof. Peters and his party found themselves obliged to be constantly on the watch, and to spend a great deal of money in bribes in order to collect fifteen large cases of tablets and other antiquities and to transport them to the coast. When the collection reached Smyrna the Turkish governor coolly took possession of the entire shipment, and transferred it to the museum at Constantinople.

Biblia reports that Prof. Peters became almost frantic with grief and rage at this confiscation of the trophies, acquired by constant vigilance and by so much money properly invested. Some of this money was recovered by the sale of the fire-arms to the natives, and some brands were snatched from the burning. Many smaller specimens, hidden in the clothing of the party, passed through the Custom House without detection, the way being made easy by the high character of the gentlemen and also by the exhibition of medals and coins, interesting to the unspeakable Turk.

It is understood that the contents of the cases, now lodged in Constantinople, refer to the story of Bel and the Dragon, and the trickeries of the priests who served in the temple of the god. It is a loss to archæology and to the history of religious ideas, that Prof. Peters was unable to convey these witnesses to the solemn frauds of a heathen superstition to their destination in the halls of the Theological Seminary, open to the sweet influences of light and truth, in a land where the natives neither bribe nor are bribed, but profess to walk by the law of duty and of conscience.

French Routes to the Sudan.—The first number of a new quarterly publication, *Annales de Géographie*, made its appearance in Paris, October 15, 1891. The *Annales* will be edited by Messrs. P. Vidal de la Blache and Marcel Dubois, and the subject-matter of each number will be classified as follows :

1. Leading articles on geographical questions.
2. Critical and Bibliographical reviews. This division is regarded as much the most important of the three.

3. Correspondence, studies of particular districts, and general news.

At the close of the year there will be presented a Review of the progress made in geographical knowledge.

The second paper in No. 1 of the *Annales* is by Mr. H. Schirmer, on "France and the Routes of Access to the Sudan."

Mr. Schirmer does not concern himself with the Eastern Sudan, which he regards as closed for a long time to come to Europeans.

The case is different with the Central and Western Sudan, both of which regions interest France, in virtue of her position in Algeria and Tunisia, as well as in Senegambia and on the coast of the Gulf of Guinea.

There are three principal approaches to the Sudan: across the Desert, by way of the Senegal River, and by the Lower Niger.

Of these the Desert route is the most ancient. The elements in its favor are that it crosses a healthful country and that it has for its starting-point an equally healthful coast region, inhabited by Europeans, and provided with needful resources. Its disadvantages are its length—1600 to 1900 miles, according to the objective point—, the poverty of the intervening country, and the unmistakable hostility of the natives.

The Senegal route is very much shorter. Medine, the head of navigation on the Senegal, is separated by 280 miles from Koulikoro (not marked on the map, but situated on the Niger, about one-third of the distance between Bammako and Segou-Sikoro). In this way it may be said that the Senegal prolongs the great artery of the middle Niger, navigable at all times for more than 600 miles to Timbuktu and beyond it, and the ancient Arab geographers expressed, not so much a geographical error, as a commercial truth, when they represented their Nile of the Blacks as flowing through the Senegal to the sea.

The disadvantages of this route are: the condition of the river, which is obstructed by rocks, so that regular navigation ceases 217 miles from the coast, at Mafou (misprinted *Mafoli* on the map); the inconveniences of the coast itself, which make the true port of the country not Saint-Louis, at the mouth of the river, but Dakar, 125 miles distant; and above all, the climate. Senegal will never be a colony with a European population, for, like the rest of tropical Africa, it is the home of malaria, and the chosen abode of yellow fever. It is, therefore, almost destitute of industrial resources, and the true base of operations in Senegal is Bordeaux.

The Niger route passes through a still more unhealthy country. In Senegal the European, it has been found, can work during the dry season. The railroad from Dakar to Saint-Louis was built by white workmen, landed by the Société des Batignolles between November and June, and reëmbarked for Bordeaux as soon as the rains set in. Nothing like this is possible on the Lower Niger, which does not flow through the Sudan, properly so-called, but through a region which belongs, by its climate and its vegetation, to Equatorial Africa, with its virgin forests, its impenetrable jungles, its oppressive and pernicious humidity. The delta of the river is nothing but a foul and offensive expanse of mud, cut up by thousands of channels, bounded towards the inner country by the unbroken forest, and lined, wherever the salt and the fresh waters meet, with jungles of the poisonous mangrove. Any one caught in this tangle is sure to have a sharp attack of fever, the Niger fever, that destroys with a touch one-half, or even three-fourths, of a man's vital strength. Altogether, the delta of the Niger, the lower Niger and the Benue are to be counted, with Lagos, the Cameruns and the Gabun, as among the most deadly regions of Africa. Not even the worst climate, however, can nullify a good commercial position, and in this respect the Niger is without a rival. It is a distinctive feature of Africa, that it is almost without rivers that can be ascended from where they enter the sea. The Niger is navigable to Rabba, 470 miles from the Gulf of Guinea, so that steamers can reach the Hausa countries, which are among the richest and most populous in the Sudan ; nor is this all, for its great affluent, the Benue, affords access much farther into the interior than the Niger itself. The Benue flows in a deep *fault* for more than 600 miles, and at the same distance from its confluence with the Niger is more than half a mile in width. Yola, at which point steam navigation now ceases, is less than 275 miles from Kuka and Lake Tchad, and the river is truly what Barth called it : " An open gateway through which the irresistible influence of Europe may pass into Africa "; and in the words of Flegel : " The only really navigable route leading to the heart of the black continent."

Mr. Schirmer reviews the history of the various efforts to interest the French public in one or another of these routes to the interior of Africa ; efforts frequently baffled and frequently renewed, until the present time, when attention is concentrated upon the route across the desert. The Transsaharan railroad is, in Mr. Schirmer's opinion, an enterprise to be carried out, but not until France has established her power at Lake Tchad. Without the control of the countries on the Lake, he argues, the railway across the Sahara would be a waste of energy and of means, for there are no resources to be developed in the broad space of 18 degrees of latitude between the southern outposts of Algeria and Bornu.

THE MISSIONARIES IN AFRICA.—Mr. Robert Needham Cust has sent a copy of his pamphlet on the Occupation of Africa by the Christian Missionaries of Europe and North America.* This is the publication which was distributed at the International Geographical Congress at Berne, to the indignation of the Germans, who are therein reproached with the "brutal cynicism" of their methods. The President of the Congress left the responsibility of this now famous phrase with its author, and he has not seen fit to modify it. The greater part of the pamphlet is devoted to an enumeration of the missionary stations, Catholic and Protestant, established in Africa. These are classified in four regions, as follows:

Region of the North.—All the country lying to the north of the parallel of 20° N. Lat., from the vicinity of Suakim on the Red Sea to Cape Blanco, on the Atlantic Coast.

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* L'Occupation de l'Afrique par les Missionaires Chrétiens de l'Europe et de l'Amérique du Nord, par M. Robert Needham Cust. Genève, 1891.

Stamped *Hommage de l'auteur*, and forwarded by the courtesy of M. Charles Faure, of *L'Afrique Explorée et Civilisée*.

Region of the West.—Comprised between the parallels of 20° N. Lat. and 18° S. Lat. ; the western limit being the Atlantic from Cape Blanco to the mouth of the Cunene River, and the eastern the meridian of 20° E. Long.

Region of the South.—Bounded on the north by the parallel of 18° S. Lat., and on the west, south and east by the ocean.

Region of the East.—Lying between the meridian of 20° E. Long. and the Indian Ocean, and the parallels of 20° N. Lat. and 18° S. Lat.

The lists give the name of the church or the sect in charge of the stations, the family to which the natives belong, the faith, whether Mohammedan or Pagan, and the native language spoken.

In the Preliminary Remarks, which fill ten pages, and in other parts of his paper, Mr. Cust says many things with an evident desire to be impartial, but his habit of mind defies control. He says on p. 9 that "nothing (in his pamphlet) will indicate to what particular fraction of Christendom the author belongs," and he adds, on p. 10: "the fault which I find with all of them (the Roman Catholic missionaries) is the exclusion of the Bible in the language of the country and the purchase, *at a low price*, of boys and girls to fill their schools and recruit members for the future Christian communities." This form of redemption, rightly denounced as a kind of slave trade, is by no means peculiar to the Roman Catholics. Mr. Cust will find, in Büttikofer's *Reisebilder aus Liberia* (Band II., S. 344), the following passage, quoted from Bishop Ferguson's Annual Report of the Protestant Episcopal Mission in Liberia for 1884–85 : "One of the saddest facts is this, that we are compelled to look on while an intelligent girl, upon whom we had set great hopes, is suddenly taken away by her parents, to become the wife of the very first heathen polygamist, who has acquired a right to her by the payment of the customary purchase-money."

This purchase-money, it is said on p. 343, is the sum of "15 and more" dollars paid by the Mission to secure the liberty of the girl to marry a Christian; and there seems to be no difference in practice between the Protestant and the Roman Catholic Missions, in buying converts, unless the LOW PRICE paid by the latter constitute an aggravation of the wrong.

Mr. Büttikofer learned his facts in Liberia, where the Protestants have had the field to themselves for sixty years; and if, as Mr. Cust affirms in an eloquent passage (on p. 10) the knowledge of the Bible in their own language will put the Africans on the level of the European and the American, how does he explain the failure of Sierra Leone and Liberia? He himself says, on p. 19: "If the civilization and the religious opinions of the nations of Europe and North America were such as to exercise a predominating influence over the peoples of Africa, inferior in civilization and destitute of fixed and intelligent religious belief, we might have expected to find, after a half-century, some manifest proof of this beneficent influence in the English colony of Sierra Leone and in the American republic of Liberia; but it is not so. No religious, moral or social impression has been made by the educated negroes of these two states upon the men of color with whom they are in relation." . . . .

The subject of Christian missionary work in Africa is, perhaps, too large to be dealt with in a pamphlet, even though this give expression to the views of a writer, who is without prejudice against Germans or Roman Catholics or Frenchmen.

New Light on Dark Africa: being the Narrative of the German Emin Pasha Expedition, the Journeyings and Adventures among the Native Tribes of Eastern Equatorial Africa, the Gallas, Massais, Wasukuma, etc., etc., on the Lake Baringo and the Victoria Nyanza. Related by Dr. Carl Peters, the Commander of the Expedition. Translated from the German by H. W. Dulcken, Ph. D.

With thirty-two Page Engravings and Sixty-five other Illustrations from Designs by Rudolph Hellgrewe, and a large Explanatory Colored Map, representing the Progress of the Expedition from Day to Day.

London, New York and Melbourne
8vo. 1891.

The real subject of this portly volume is the Greatness of Dr. Carl Peters, recorded by himself.

As a contribution to the Emin Pasha literature, it amounts to nothing more than reiteration of the statements made by Emin to nearly every one, who has talked with him since his return from Central Africa.

Dr. Peters reached Shimbye, a little above 2° S. Lat., after many difficulties interposed by the English authorities, and especially by Admiral Fremantle; and his line of march led him from the coast in a general northwesterly direction to the Victoria Nyanza, and along its western side to the southern end, and thence in a south-easterly direction to Bagamoyo.

The first part of the route lay through the territory of the Gallas and the warlike Masais, and Dr. Peters selected this route, he declares on p. 221, because its reported dangers had daunted other explorers, and especially Stanley. Thomson, who allowed himself to be bullied and humiliated by the Masais, is treated as a weakling. "I have tried," says Dr. Peters, "to produce an impression on the Massais by means of forest fires, by fiery rockets, and even by a total eclipse of the sun, that happened to occur on December 23d; but I have found, after all, that the one thing which would make an impression on these wild sons of the steppe was a bullet from the repeater or double-barrelled rifle, and then only when employed in emphatic relation to their own bodies."

It was unlucky for the Masais that the English had annoyed Dr. Peters on the sea, where the wretches were too strong for him. He can find no vent for his feelings but in alliterative Latin: "Though I had been obliged to make use of stratagem against the English ships of war, I was certainly resolved to employ the means far more sympathetic to me, the *vis vim vi expellit*, in opposing any such violence by land." This he never had the chance to do, for the Englishmen were horribly afraid that he would grind their bones to make him bread; and they kept out of his way. He revenges himself for the disappointment by repeating all the fine things the natives said about him, and their contemptuous opinion of the English. "There have been Englishmen here too," said the Wapokomo. "But we know that the Englishmen are quite little, and thou art very great. Thou art as God. Give us peace, great Lord; we will do everything that thou desirest" (p. 134). Wherever he went, Dr. Peters was a great Lord; but he was heavy-hearted, and could only find relief by killing somebody. Gallas, Wapokomo, Wadsagga, Wandorobbo, Masais and Wagogo were alike to him. If they were friendly they were killed, because they might change their minds; if they strutted like turkey-cocks and bragged they were killed, because they seemed to mock Dr. Peters; if they hid themselves, they were hunted down; if they came out in numbers, they were shot, for the great point was to keep up the Kupanda-Sharo feeling in the camp.*

This feeling was the moral force of the men, but the Kupanda-Sharo himself was sustained also, he tells us on p. 193, by the great principle that makes itself felt through the universe, even in inorganic nature, the principle of unlimited justice. Nor by this alone did he walk; his soul soared above the petty cares of life, when he looked on the Falls of the Tana, or the icy-peaked crown of Kenia, or the wondrous beauty of the landscape on the Victoria Nyanza. Aspiration is as natural to him as gravitation, and he is a mine of sentiment. After a fight, in which he killed a number of Masais, he set fire to the homes of the tribe, and the sight of the destruction called forth the following passage, warm with dear associations, and the flush of bloodshed. "What time the Advent bells were calling to church in Germany, the flames were crackling over the great kraal on all sides, and mounting towards the heaven" (p. 239).

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* "Kupanda-Sharo, that is to say, climber of mountains, was the name which I had borne from the beginning of my expedition, and which is now becoming more and more known among the native tribes. My people had composed special songs upon this name, and these they were accustomed to sing upon such occasions as the present, especially the Wanjamwesi girls. I remember how, on that very evening, one of these girls, as she husked the corn, sang a song of which the burden always was: 'Others have nothing to eat; Kupanda-Sharo gives us to eat'."—(*New Light on Dark Africa, pp. 188–189*).

Neither life, nor death, nor right, nor sense of shame, can stay the apostle of unlimited justice.

He says on p. 329 that all his letters and reports, left in English hands to be forwarded to Europe, were lost. On p. 357 he tells how letters addressed to the gentlemen of the English expedition were handed to him by some Waganda men : . . . "I was on the point of returning them, when I suddenly perceived that on one of them H. M. Stanley was indicated as the sender. A joyful hope thrilled through me at this sight, that the news of Stanley's departure must be incorrect, for if he was now sending a letter to Usoga he could not possibly have left the Equatorial Province five months ago. Marco put an end to my uncertainty by tearing open the letter, and giving it to me to read; and under the peculiar circumstances in which I was placed, I felt myself perfectly justified in doing so." An illustration on p. 361 shows the reader in the act.

Dr. Peters confirms by his observations the accuracy of Thomson's account of the Masais. Among these people there is a strict separation of the married from the unmarried men. These are called Elmoran, and they are warriors. Like Cæsar's Britons, they live on milk and meat, but must never take both at the same meal. The milk is generally eaten in a sour state.

The Elmoran live in villages of their own, in the society of the young women, who are free to choose their lovers. The young men are naturally reluctant to give up this kind of existence, but when the father sees fit to arrange a marriage for his son, the latter must submit.

It may be a consequence of this submission that the husband is always indifferent to his wife's conduct after marriage.

Full of interest is the account of Uganda and its people. Dr. Peters is convinced that the Waganda excel, in the development of their intelligence, every other African nation. In contrast to all other negro tribes, the Waganda feel the necessity of progress. Christianity, it appears, has spread among this people with amazing rapidity, when once the superiority of the white race was understood; and in its train have come the arts of reading and writing. Stanley had already told us that the Waganda used the Arabic characters.

They have great mechanical skill, and at Rubaga they replaced in one of the magazine guns a lost part of the machinery, by which the cartridges were rapidly thrown out after the weapon had been discharged.

The Waganda belong to the Bantu stock, modified, according to the native tradition, by a people from the north, called by Dr. Felkin the Wahuma, and identified by Dr. Peters with the Beyma, still existing in Uganda in very great numbers. The Beyma men keep to themselves, but their women are everywhere sought for on account of their remarkable beauty.

" So far as I saw," says Dr. Peters, " the Beyma were of a slender type, with dewy, dreamy eyes, and features of almost a Caucasian cast; their color is light brown, and their faces reminded one of the figures in an ancient Egyptian temple."

It may yet be discovered that the influence of Egypt formerly extended to Uganda. Dr. Peters notes (p. 421) that the name for the Nile is, in Uganda *Kyira*, or *Kyila*, and in Usoga, *Nyiro* or *Nyilo*. At Mengo, almost on the north shore of the Victoria Nyanza, are thirty-three royal tombs of the tribe of the Wakintu. These tombs are in the shape of cones, and the visitor on entering one, finds himself in a dusky hall, supported by a row of columns. In the background is a painted curtain and before it are the weapons and favorite movables of the deceased.

Behind the curtain is an area from which shafts and corridors, lined with textile stuffs, cowrie shells and other articles of value, lead to the coffin, which contains the embalmed corpse. These forms of burial are not met with in the other Bantu tribes, though they are known in Madagascar.

Dr. Peters was told by Muanga (king of Uganda) that the most ancient of the Mengo tombs contained the primæval records of the dynasty; and the missionaries confirmed this statement, though it does not appear that they had independent sources of information.

The forcible "rescue" of Emin naturally grieved the Commander of the German Emin Pasha Expedition, and he comes to the conclusion (p. 548) that "Stanley's enterprise has been absolutely hurtful in its effects for the general interests of humanity, and for the special interests of England." This is a case of the mote and the beam, for it is not to be doubted that the murderous raid, conducted by the leader of the Wadutschi (Germans), has left an abiding hatred of the white man in the countries through which it passed.

Dr. Peters might do good work, if kept sternly in hand by a superior officer, but he has singular unfitness for command.

Cuadros Americanos. Venezuela, Brazil, California, Guatemala, Montevideo y Ecuador. Por Manuel Llorente Vázquez, Ministro que ha sido de España en América, con un prólogo de Luis Vidart.

Madrid, 1891.

These "American Pictures" are full of life and fire. His readers may, or may not, agree with the author, but they must confess that he stands by his convictions and utters his mind without fear or favor, in an aggressive tone like that of Sir Lepel Griffin. Like the Englishman, the Spaniard has a fund of good sense and makes many just remarks, in spite of his settled prejudice against American institutions. Mr. Vázquez condemns with impartiality the political and the social life of the South American countries, in which he represented his government. Brazil (then an Empire) fares no better at his hands than Buenos Aires or Venezuela. He was struck by the commercial activity and the prosperity of Buenos Aires, and also by its pretentious air. "During my short residence," he says, "I heard more talk about *high life* and aristocracy than in England, France and Spain;" and he dismisses the subject of municipal administration in two lines: "The aspect of Buenos Aires is dirty, and its streets are infernal. It is a torture to ride through them in a carriage."

He considers that the Argentine Republic has taken the place of Brazil as the leading South American nation. The political changes in Brazil would not have occurred if the Emperor had been equal to his position; and Mr. Vázquez looks for a disintegration of the new republic.

Two places in America charmed him, San Juan de Puerto Rico and San Francisco, California. Patriotic feeling colors, but does not exaggerate, the description of San Juan, with its natural beauty and cleanliness and thorough administration; and here, oddly enough, Mr. Vázquez made acquaintance with a seductive compound, the *rabo de gallo*, or *cok-teil.**

He devotes a whole chapter to San Francisco, "a grand-looking city, with all the refinements and comforts of life," and most picturesquely situated. He visited the Academy of Sciences, the libraries, the clubs, the theatre, the Cliff House, San Rafael and the other suburbs. He admired the cable-roads, climbing and descending the hills, investigated the Chinese quarter and lunched in the excellent restaurants; and, as for the hotels, he doubts whether all the others in the world can surpass the Palace Hotel. Of the women he says: "When I was there, all the beauties of San Francisco could be seen in Geary Street at half past four or five o'clock on Saturday afternoon, coming out from the matinées. They are, in general, finely formed, though perhaps too sculpturesque, with delicate features and vigorous, graceful figures. They go about alone, well aware to what they are exposed, and accept little favors, to which they attach slight importance; but they are generally respected, the piratical cruiser, so common with us, being here unknown."

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* So spelled, probably, to render the pronunciation of *Cocktail*. It is not a pretty word, and a kindly gloom overshadows its origin; but it seems to be formed of a verb and a noun rather than of two nouns and, if so, *rabo arriba* would come nearer to the meaning than *rabo de gallo*. It is no great addition, in any shape, to the wealth of a language.

The chapter on Uruguay is very entertaining. Mr. Vázquez defends the bull-fight as the school of heroism, much in the style of the English and Americans who uphold the prize-fight; he takes up a composition of Mr. Sarmiento's, and convicts him of bad Spanish; and he tells, in *El Mate de las Morales*, a story of Uruguayan manners and speech, in which *c* becomes *s*.

In Ecuador, Mr. Vázquez met with Father Tobías, a Jesuit missionary who had labored among the Jíbaros, a tribe of Indians dwelling on the banks of the Napo, in the province of Oriente.

Father Tobías gave the following description of their habits and customs.

They are untamed savages, and regard servitude as equally disgraceful with cowardice, and their bearing is defiant to the point of insolence. Their weapons are the machete, a knife, and a lance of *chonta* wood (a very hard palm), generally tipped with iron, procured from the whites. They use also a tube made of two strips of *chonta* wood, and a poisoned arrow, which they blow through the tube to a great distance. The poison, which is of a vegetable origin, is obtained from other tribes, living on the Marañon. The Jíbaros are well-made, active men. Orton says (*The Andes and the Amazon, p. 171*) that many of them approach the Caucasian type, the beard and lighter skin indicating a percentage of Spanish blood, but Father Tobías makes no such observation. Their dress consists of small clothes, covering the person from the waist half way to the knee, or, in a few cases, of a cotton cloth, striped red and black, wound about the middle and hanging down. Some have learned the use of shirts and drawers. Both men and women wear necklaces of beads and bugles, and the face is always painted.

They are the most industrious tribe in the province of Oriente, and plant, in the clearings they make in the forest, yucca, maize, plantains, sweet potatoes, peanuts, cotton and tobacco.

Women are beasts of burden, and the man takes all he can get.

The dwellings of the Jíbaros are well-built houses, made of the *chonta* palm wood. They are 15 or 20 yards in length by 10 or 12 broad, and 16 or 17 feet in height. The roof is made of a species of bamboo, the *guádua*,* covered with leaves to shed the rain.

There is no social or political organization, each man being absolute master of his own household; and the children grow up like so many domestic animals.

The only semblance of religion is the fear of the devil; but the Jíbaros who are in contact with converted Indians have a conception of God and future rewards and punishments, as well as of the necessity of baptism.

They are extremely superstitious and treacherous. A dream will make a Jíbaro plot the death of another, and the assassinations, which are of frequent occurrence in the tribe, have no other origin. An offense is never forgiven, though years may pass before the opportunity for revenge offers itself.

There is no such thing as open warfare. The Jíbaros make, on the contrary, every demonstration of friendliness until the enemy is off his guard, and can be killed without danger.

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* Velazquez de la Cadena writes the word *Guadúa*.

In time of war they make signals to each other by blows upon a kind of drum, composed of the hollow trunk of a tree, 10 or 12 feet long and 2 feet in diameter.

The father is the recognized head of the family and not, as among many savage tribes, the maternal uncle.

When a clearing is made in order to plant the yucca, from which they prepare the *chicha* that they drink, they begin a fast, which continues till the yucca is ripe for use. Their food during this period consists of plantains and yucca, and occasionally a little fish or some birds.

At the end of the fast they indulge, for six or eight days, in a grand carouse.

They have a way of drying the heads of their enemies by removing the bones and heating the cavity with red-hot stones, until the flesh is mummified. These trophies are called *Sancas*, and Father Pozzi says (*Annales de la Propagation de la Foi, Sept., 1871*), that it is the custom to attach them to the end of the hair, gathered in a long tress, when the warriors are going out to battle, or at the time of a great solemnity.

The only musical instrument of the Jíbaros is a flute made of a cane, with one large hole for the mouth and two smaller ones for the fingers.

In their houses they use blocks of wood for seats, and they sleep on bedsteads made of four posts fixed in the ground, and on these *chonta* boards covered with *guádua*, split very small. They lie with their feet to a fire, which is kept burning all night.

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BERLIN.—*Verhandlungen der Gesellschaft für Erdkunde.*

Travels in the *Hinterland* of Kamerun in 1889-1891 (Lieut. Morgen)—Guiana in 1890 (Prof. Dr. W. Joest)—Preliminary Expedition to West Greenland (Dr. E. von Drygalski)—Two Days in Atjeh (Sumatra), by Dr. A. Baessler.

Zeitschrift.

Contributions to the Geography of Central Brazil, by Dr. P. Ehrenreich—Essay towards an Orography of the Kuen-lun Range, by Dr. Geo. Wegener.

EDINBURGH.—*The Scottish Geographical Magazine.*

The Geography of South-West Africa, With a Bibliography of South-West Africa from 1884 to 1891. By Dr. Henry Schlichter—Mineral Resources of Colorado. By Wm. A. Bell, M. A., etc.—The British Association, 1891—The Field of Geography. By E. G. Ravenstein, F. R. S. G. S., etc.—International Geographical Congress, 1891—Britannic Confederation: V. Alternative Measures. By Maurice H. Hervey, Principal of the Illiwarra College, New South Wales—Notes on the Inhabitants of the Himalayas. By Colonel Tanner (Read at Meeting of British Association, 1891)—The Mapping of the World: Part IV. North America. By John George Bartholomew, F. R. S. E., F. R. G. S. (with a map.)

GOTHA.—*Petermanns Mitteilungen.*

The Ocean Currents and the Relations of Temperature in the East-Asiatic Waters, by Dr. G.

Schott—Father Schynse on the South-Western Shore of the Victoria Nyanza—The Late Numbers of Stieler's Hand-Atlas, by H. Habenicht—Cartography of Atacama, by Prof. Dr. L. Brackebusch—Dr. Anton Stecker's Travels in the Galla Lands in 1882. From his Journals, by G. E. Fritzsche—Ascent of the Volcano of Ollagua (Frontier-line of Chile and Bolivia) by Hans Berger—Geographical Determination of Positions made by Father Schynse in his Journey from the Victoria Nyanza to the La Longa Mission, Kondoa. Calculated by R. Spitaler, Imp.-Roy. Observatory, Vienna—The Fifth International Geographical Congress, at Berne, August 10-14, 1891; by Dr. H. Wichmann.

Ergänzungsheft.

Nr. 101: The population of the Earth—VIII—by Herman Wagner and Alexander Supan—Nr. 102: The Adam's Bridge and the Coral Reefs of the Palk Strait (between India and Ceylon) by John Walther.

London.—*Royal Geographical Society, Proceedings.*

The Yoruba Country, West Africa. By Alvan Millson—A Journey through Gazaland. By Denis Doyle—Notes on the Present State of the Karun River, between Shushter and the Shat-El-Arab. By Henry Blosse Lynch—African Boundaries and the Application of Indian Systems of Geographical Survey to Africa, by Lieut. Col. T. H. Holdich, R. E.—Journey across the Western Portion of the

Great Persian Desert, via the Siah Kuh Mountains and the Darya-I-Namak. By C. E. Biddulph—A Journey through Part of Somaliland, between Zeila and Bulhar. By Lieut. Charles G. Nurse—Notes on the Sabaeans. By Dr. A. Houtum-Schindler—Photography and Exploration. By John Thomson—Bar-Subtense Survey. By Col. H. C. B. Tanner.

MADRID.—*Sociedad Geográfica de Madrid, Boletín.*—

Hypsometrical Map of Spain and Portugal, by D. Federico de Botella y de Hornos: Report by D. Francisco Coello—Authentic Notices of the Famous River Marañón, by D. Marcos Jiménez de la Espada—The Geographical Society of Madrid and the International Geographical Congress at Berne—The Right of Search—The Natives of Burgos and Santander in the Indies, 1536: An address read by D. Enrique de Leguina, Baron de la Vega de Hoz—The Congo Free State in 1891—Spanish-Portuguese-American Geographical Congress (October)—The Galápagos Islands.

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—The Congo Free State—Spanish Guinea, by D. José Valero y Belenguer.

PARIS.—*Annales de Géographie.*

Exterior France, by P. Foncin—France and the Routes of Access to the Sudan, by H. Schirmer—Recent Works on the Geography of France, by P. Vidal de la Blache—European Geography in Recent Years, by P. Camena d'Almeida—The Geography of Africa in 1880 and in 1890, by H. Schirmer—America, by L. Gallois—Oceanography and Oceania, by Marcel Dubois—Note on the Development of the Navigation of the Rhone, by A. Rainaud—Notes of Travel in Northern Bulgaria, by A. Guilloux—The Siberian Railway, by P. Camena d'Almeida—Chronicle, by Eug. Guillot.

Société de Géographie, Comptes Rendus.

Remains of Camille Douls—Railroads in the English Colonies—Navigation on the Siberian Rivers and Lakes: Note by Baron A. de Bieberstein—Mr. J. Martin's Travels in China—Map of the Sanga—M. Foa's Notes on South Africa—M. Dècle on the Zambezi—Scientific Station at Tor (western side of the Sinaïtic Peninsula)—Mr. Israel Russell's Expedition in Alaska—Dr. Meyners d'Estrey on the Astronomical Knowledge of the Dyaks, and on Palæontological Researches in Java—M. Rabot on the eastern Coast of Iceland—Discovery of a supposed portrait of Columbus at the Château of the Valençay—Restoration of the Monument to Dumont d'Urville—A

Manuscript Atlas of 1563, by Stella, discovered in the Royal Library of Stockholm—Dutreuil de Rhins and Grenard in Chinese Turkistan—The Sacred Island of Puto (Chusan, China)—Etymology of the word *Senegal*—The Expedition of Lionel Dècle and Lalaing in South Africa—Brazilian Rivers—The Maunier Colony in Córdoba (Argentine Republic)—Monument to Doudart de Lagrée (explorer of Indo-China)—The Fans and the African Missions—M. Claine's Travels in Sumatra and the Malay Peninsula.

ROME.—*Società Geografica Italiana; Bollettino.*

The Geographical Congress at Berne, by Count Luchino dal Verme—From La Paz to Irupana (Prof. L. Balzan)—From Berbera to Oduan, by D. Eugenio Ruspoli—The Geographical Institute of Vienna and Its Labors, by Prof. G. Marinelli—The First Crossing of the Somali Peninsula; letters of Bricchetti-Robecchi—Letter from Dr. Traversi—Ethnographical Collection of the Southeastern Peninsula of New Guinea, made by Dr. Lamberto Loria: with notes by Dr. G. A. Colini.—The Geographical Congress at Berne: letter of Count L. dal Verme, and Report by Prof. G. Ricchieri—On Two Letters of Amerigo Vespucci (1500–1501) by Prof. L. Hugues.—Emancipation of Colonies, by Prof. Dr. G. Coen.

VIENNA.—*Mittheilungen der Kais. Königl. Geographischen Gesellschaft.*

The Beg Dagh and Malatia (Kurdistan) by Prof.

Joseph Wünsch,—Rainfall of Croatia, by Arthur Franovic—Paraguay, "The Land of Women," by Lieut. W. Kreuth.—Special Maps and Reliefs in Schools, by Prof. Dr. E. Richter.—Survey of the Tribes in the eastern Horn of Africa and their Camping-Grounds.

OBITUARY.

PEDRO II.—The ex-Emperor of Brazil, an Honorary Member of the American Geographical Society since 1878, died in Paris, at midnight, December 4, 1891.

The funeral services were conducted with appropriate display, and a military escort accompanied the procession to the railway station, where the coffin was placed upon the train for Lisbon, there to be laid in the sepulchre of the Portuguese kings.

The funeral car was received with royal honors at every town through which it passed.

Dom Pedro was born at Rio de Janeiro, December 2, 1825, and became emperor at the age of six years, by the abdication of his father. He assumed the government July 23, 1840, and, one year later, was crowned.

Revolutionary movements disturbed the empire up to the year 1848, but they were all successfully repressed, and the condition of Brazil during the forty years, which ended with the sudden uprising of the 15th November, 1889, was one of peace and steady progress. It is a question how much of this prosperity is to be ascribed to the wisdom and statesmanship of the emperor, universally believed to have been more deeply interested in literary and scientific questions than in problems of government ; but there can be no doubt of his attachment to constitutional freedom and his readiness to sacrifice personal ambition to the good of his people. Something is to be forgiven to a monarch, who set an example of devotion to aims, noble in themselves and wholesome in their influence, for these are not the least permanent among the forces which sustain the vitality of a nation. It is given to few among the rulers of men, as it was given to the ex-Emperor of Brazil, to pass from the world, followed by the regret and respect and admiration of every people.